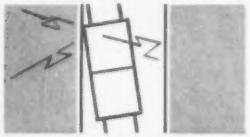
Williston Basin Roundup

the OIL AND GAS JOURNAL

PB *protection notes*

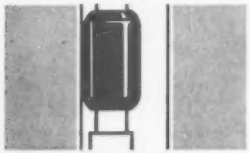
WHY PROTECT?

Engineers, unfamiliar with the complex problems of deep well drilling, often ask, "Why use protectors?" The immediate and obvious answer, of course, is *to reduce friction and wear.* Friction in shallow well drilling is much less of a problem, though it does exist. But deep well drilling often means that more than 10,000 feet of drill pipe stretch between the power source on the rig and the bit at the bottom of the hole...and 10,000 feet of unsupported drill pipe is going to bend and corkscrew, tool joints are going to wear against casing walls...if there are no bearing surfaces to prevent wear.



A protector installed above each tool joint pin holds pipe and joints away from the casing, eliminating unnecessary wear and excessive friction. Because there is less friction, the entire string rotates more freely. This means that less power is required to rotate the bit, and in addition means better control of the weight on the bit.

A less obvious reason for installing protectors is *saving time, equipment and money.* Reduced friction means less torque and faster drilling. Thus costs are reduced because power requirements are lower, and total drilling time per well is less, *and* savings more than offset the total cost of protection.



Most important reason of all for guarding your rig with casing protectors is the saving of almost irreplaceable drill pipe and casing. Frequently, casing alone accounts for more than a third of the total cost of drilling. In addition, it's just plain hard to buy. It's a big investment, and it can be safeguarded best with protectors. The net result of installing 100% protection with PB Casing Protectors is *saving:* saving in power, in time, in money, and in costly casing and drill pipe.

Make a note now to protect with PB.

it's Canny *to save*

CASING PROTECTORS

save drill pipe and casing

It's no secret that drilling is expensive, and with today's scarcity of steel, drill pipe and casing *has to last!* Casing alone often represents more than a third of the total cost of drilling—*protection is important!* Be certain you get maximum protection...Be safe and sure with PB Protectors!

PB Protectors help you save, because they—

Eliminate unnecessary casing wear • Protect tool joints and save drill pipe • Decrease torque and hoisting loads • Reduce the danger of bent pipe, corkscrewing and twist-offs • Prevent metal-to-metal friction • Lower power requirements • Cut drilling time per job

Be Canny Install PB Casing Protectors on your rig...because PB Protectors will help you save!

Available at your nearest supply store or thru your BJ-PB Representative

Byron Jackson Co.

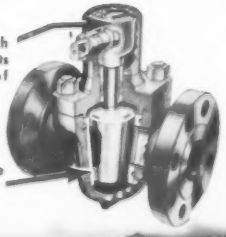
OIL FIELD & INDUSTRIAL SPECIALTIES

This valve was tailor-made for you!

Operators of a wartime alkylation unit, faced with the problem of handling corrosive hydroflouric acid, commissioned Cameron engineers to design a valve for that specific service. The Cameron Non-Lubricated Lift-Plug Valve is the result. It combines the best features of conventional valves with such innovations as a separate, renewable seat and a unique plug actuator which, in ¼-turn of the operating lever, lifts the plug free of the seat, then rotates the plug to open or closed position, and reseats the plug. The separate seat not only permits any desired trim for specific services and facilitates maintenance of the valve, it also provides a seat for the plug which does not distort with the body due to line strains. Consequently, no lubricant is required either to effect a seal or for easy operation.

Test-operate a few of these great valves in your own plant in your most difficult services . . . elevated temperatures, vacuum, high pressures, or corrosive products . . . and get first-hand information on their superior design.

the Cameron NON-LUBRICATED LIFT-PLUG VALVE



Plug actuator which lifts, turns, and seats plug in ¼-turn of operating lever.

Separate, renewable seat.

Cameron IRON WORKS, INC.
P. O. BOX 1212
HOUSTON, TEXAS

Export Office: 74 Trinity Place, New York, N. Y. ● Sterling Area: British Oil Field Equipment Co., Ltd., Duke's Court, St. James's, London S.W.1, England. ● California: Cameron Iron Works of California, Box 267, Long Beach. ● Canada: Cameron Iron Works of Canada, Ltd., 9860-88th Ave., Suite 3, Edmonton, Alberta.

SELLING THROUGH SUPPLY STORES

THE OIL AND GAS
JOURNAL
Vol. 51, No. 10

NEXT WEEK

- Production Report, Venice Field, Louisiana.
- How to Reduce Losses in a Refinery.
- Humble's New Effluent Filtration Unit.
- Petrochem Report: Ethyl Corp., Houston.
- Small Refiner's Role in the Petrochemical Industry.
- Selection of Drilling and Completion Fluids — California.
- How to Make Process Flow Sheets.
- How Sohio Fights Air Pollution.
- Crude-Oil Reserves in Southwest Texas.
- Other Articles and Regular Features.

CONTENTS FOR JULY 14, 1952

NEWS FEATURES

Journal Survey Shows L.P.G. Underground Storage to Treble 70
PAD-Backed Drilling Program Would Provide Production Cushion 71
Congress Quits Work With Many Oil Bills Still Pending 73
Esso Standard's Baton Rouge Plant Guarding Against Sabotage 75
Steel Strike Stopping Work on Pipe Lines, Slowing Drilling 76
Materials Commission List Seven Musts in Field of Research 76
Gas Industry Expenditures to Hit Another New High Next Year 77
Another New Drilling Mark Set in Three-State Rocky Mountain Area 78
California Operators Set Production Record, But Still Are Short 79
Union Lays Producing Lines Before Drilling at Sansinena 79
New Drilling Campaign Developing in Oklahoma's Anadarko Basin 80
Trans Mountain Contractors Challenged by 400 Miles of Mountains 83
Contract Letting Revealed by Trans Northern Pipe Line Co. 83
Royal Dutch-Shell Gets Rights Off Qatar Released by Superior 84
Mossadegh Is Reappointed Iranian Premier by Narrow Margin 84
Drilling Success Reported in Turkey; New Refinery Being Planned 84
Anglo-Iranian Reports Kuwait Concession Extended 17 Years 86
All Predictions of Refining Capacity Gains in Europe Surpassed 86

ENGINEERING - OPERATING FEATURES

• **WILLISTON BASIN ROUNDUP**

Williston Basin—Today's Most Exciting Oil Province 92
Two and one-half billion barrels of oil to be recovered from basin; production forecast shows 200,000 bbl. daily in 10 years. By Philip C. Ingalls.

How the Basin Got Its Name 97
Result of United States Geological Survey in 1922. By W. T. Thom, Jr., Princeton University.

Big Drilling in Prospect 98
Fifty-one active drilling rigs in basin; 20 are in eastern Montana. By Joseph A. Kornfeld.

Drilling Log of Williston Basin Well 106
Complete drilling information shown in this curve-type report.

Moving and Refining Williston Basin's Oil 108
Williston crude may move to Pacific Northwest; complete with Canadian crude. By John C. Casper.

• **OTHER FEATURES**

Turnaround of a Combination Unit 119
Unit rated at 25,000 bbl. per day crude-oil input; light and heavy gas-oil cracking; reduced crude coking. By George Weber.

Petrochem Report: E. I. du Pont de Nemours & Co. 122
Since 1945, company has expended more than half billion dollars to enlarge three Texas plants. By F. Lawrence Resen.

Conservation of Products in Storage 125
Storage tanks containing volatile products should be painted in entirety with white paint. By S. S. Smith and G. D. Harden, Shell Oil Co.

On the Job . . . In the Fields 128-129
On the Job . . . In the Plants 130
Engineering Reference Section 131
Modern Drilling 133
Refiner's Notebook 135
Progress in Metals 137
Engineering Fundamentals 139
Corrosion Control 141

REGULAR DEPARTMENTS

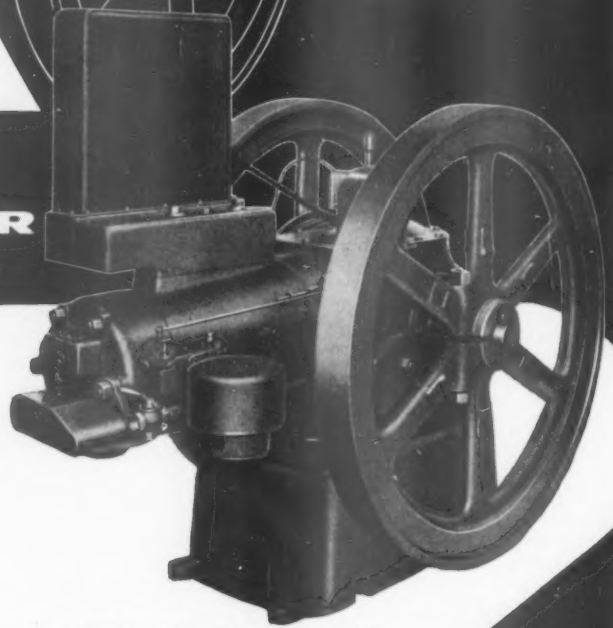
They Say 54
Calendar of Events 60
Journally Speaking 65
Editorial 67
This Week 69
Watching Washington 72
International News 84
Personals 88
Deaths in the Industry 91
Books 114
On the Job 128
Engineering Reference 131
Modern Drilling 133
Refiner's Notebook 135
Progress in Metals 137
Engineering Fundamentals 139
Corrosion Control 141
Pipe-Line Construction 142
Pipe-Line News 150
Natural-Gas News 155
Refining News 156
Drilling Contractors 159
Active Rotary Rigs 160
Exploration Statistics 184
Production Statistics 185
Refining Statistics 186
Market Statistics 187
Equipment Men in News 188
Classified Advertising 193
Advertisers' Index 197

EXPLORATION—DEVELOPMENT

Williston Basin Supplement 163
Highlights of Week 163
Reports by Areas 165

THIS BALANCE

...IS IN YOUR FAVOR



Two flywheels mean better balance . . . more stability on the mounting pedestal. No chance with a "ZC" for unbalanced flywheel effect to cause the engine to work loose from its mounting.

An outstanding performance advantage of the Fairbanks-Morse "ZC" is the *balanced* power output you get with the TWO big flywheels located between the engine and the pumping gear unit. And with TWO flywheels, you can drive from either side of the engine.

Load fluctuations are "smoothed out" by the properly proportioned flywheels, while the power of the engine remains constant. The flywheels store excess energy on the down stroke of the rods . . . then use this stored energy to equalize the load at the peak demand of the up stroke. You not only get smoother pumping . . . you protect engine and driven equipment against overload and abuse.

For the complete story on the "ZC," and the broad range of sizes, see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

High tinctorial strength

of DU PONT OIL BLUE A helps keep engine intake system deposits at a minimum

DU PONT OIL BLUE A is available for use in both aviation and motor gasolines. This single component dye dissolves rapidly in gasoline and other petroleum fractions. It can easily be added in concentrated solutions with proportioning equipment, or directly by means of a "dye pot."

Because of high tinctorial strength, it can be used in economically lower concentrations to achieve any required color intensity. This quality also helps keep engine intake system deposits at a minimum.

Due to its many desirable characteristics, Oil Blue A is used to color Du Pont Tetraethyl Lead Compound—Aviation Mix, where it provides a base for all three standard aviation gasoline colors. Why not ask your Du Pont Petroleum Chemicals Division representative for a sample?

SOLUBILITY—The solubility characteristics of Oil Blue A in gasolines will vary according to their composition. However, the following guide for approximate solubilities in typical gasoline components may be helpful:

APPROXIMATE SOLUBILITY . . . . Grams/100 U. S. Gal.	
Straight Run Gasoline	760-950
Thermal Cracked Gasoline	1150-1500
Aviation Gasoline	570-760
Benzene	28400-32000

DU PONT
Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

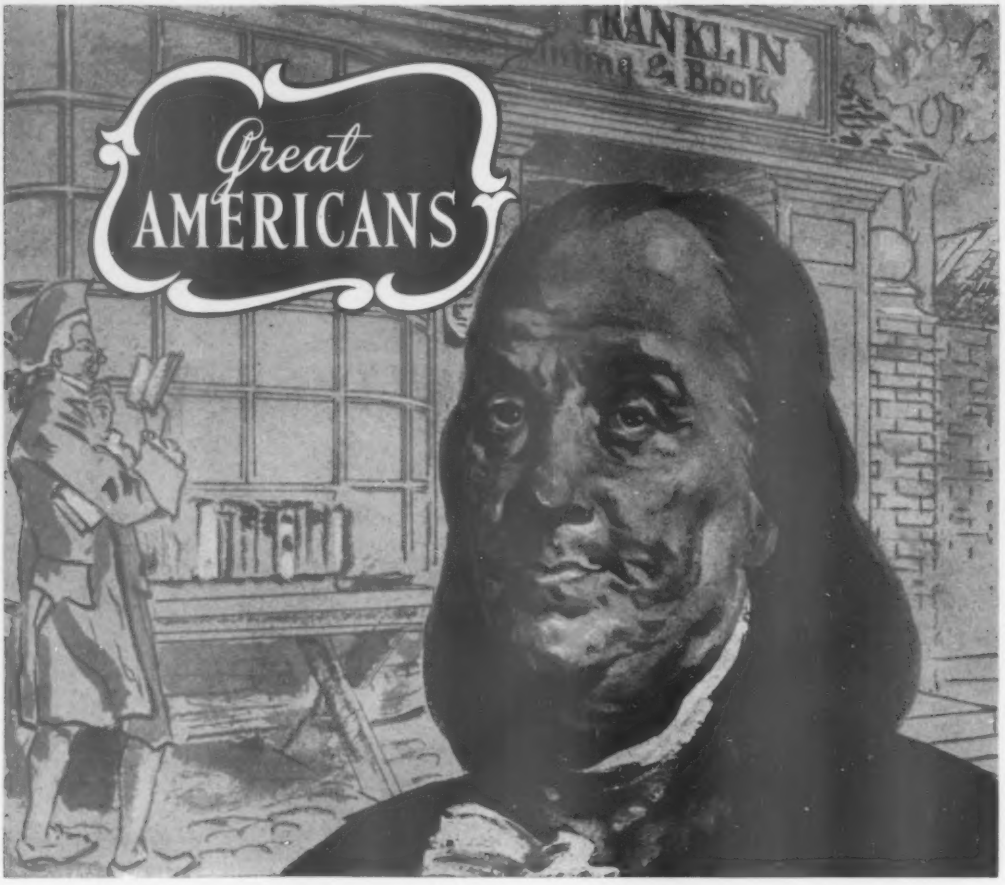
E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices: New York, N. Y. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · Los Angeles, Calif.

District Laboratories: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · El Monte, Calif.

IN CANADA: Canadian Industries Limited—Toronto, Ont.—Montreal, Que.—Calgary, Alta.

The Oil and Gas Journal, published Mondays, copyright 1952, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly



"They that give up essential liberty to obtain a little temporary safety deserve neither liberty nor safety."

—Benjamin Franklin (1706-1790)

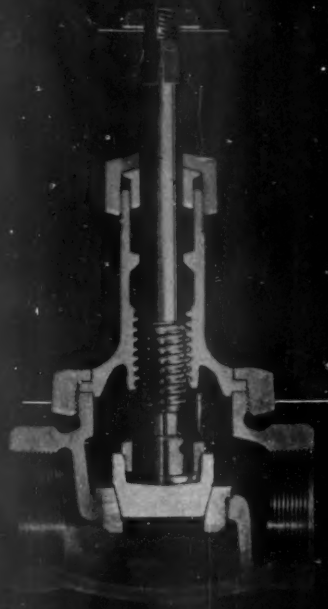
AMERICAN PUMPING UNITS are great for holding down operating costs because they pump year after year with almost no servicing or attention. You get highest efficiency on each well by choosing exactly the right AMERICAN Unit from many different combinations of structure and reducer sizes. Write for Catalog 151. Contact your favorite supply store or the nearest American office.

AMERICAN

MANUFACTURING COMPANY OF TEXAS

FORT WORTH 11, TEXAS

Branch Offices: HOUSTON—KILGORE—ODESSA—TULSA



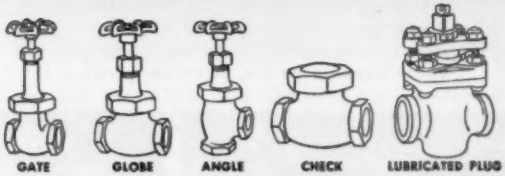
BRONZE

COMPLETE LINES OF BRONZE VALVES AND PIPE FITTINGS are manufactured by Walworth in a variety of types, pressure ratings, sizes, and patterns, including Walseal® Bronze Valves and Fittings for making Silbraz® joints.

Walworth also manufactures complete lines of valves and fittings – including Lubricated Plug Valves – made of steel, iron, and special alloys as well as bronze.

Walworth-made valves, pipe fittings, and pipe wrenches, total approximately 50,000 items—all sold through distributors in principal centers throughout the world.

Let Walworth engineers help you with your problems. For full information call your local distributor, nearest Walworth sales office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.



Bronze valves in gate, globe, angle, check, and lubricated plug types are manufactured by Walworth. Illustrated is a sectional view of a Walworth No. 225P Bronze Globe Valve. This valve has a working steam pressure rating of 350 psi at 550F (1,000 psi non-shock cold water, oil, and gas pressure). It features a renewable, plug type, stainless steel seat and disc, heat treated to 500 Brinell hardness.

WALWORTH

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

G-E RADIO CONTROL SPEEDS REPAIRS ON NATURAL GAS PIPELINE

GAS LEAKS in a 240-mile pipeline can be expensive, especially if the line runs through mountainous country. But by spotting the leaks quickly, then summoning repair crews by radio, pipeline operators can save miles of deadhead driving and hundreds of manhours.

In western Pennsylvania, the Trans-Penn Transit System produces and pipes natural gas to its distributing customers. To prevent long shutdowns due to breaks in the line, the company employs G-E 2-way radio units in trucks and supervisory vehicles, as well as at drilling rigs and compressor stations. This high-speed communication system helps three repair crews do the work of four with less effort, less waste motion.

General Electric's CAS* man at the G-E office near you can demonstrate how to cut communication costs in *your* business. Call him today. There's no obligation. *General Electric Company, Electronics Park, Syracuse, N. Y.*

Communications Advisory Service

Isolated compressor station is "on the air" at any time with radio. Operator sends pressure reports at specific intervals, receives orders from headquarters 60 miles away, instantly.

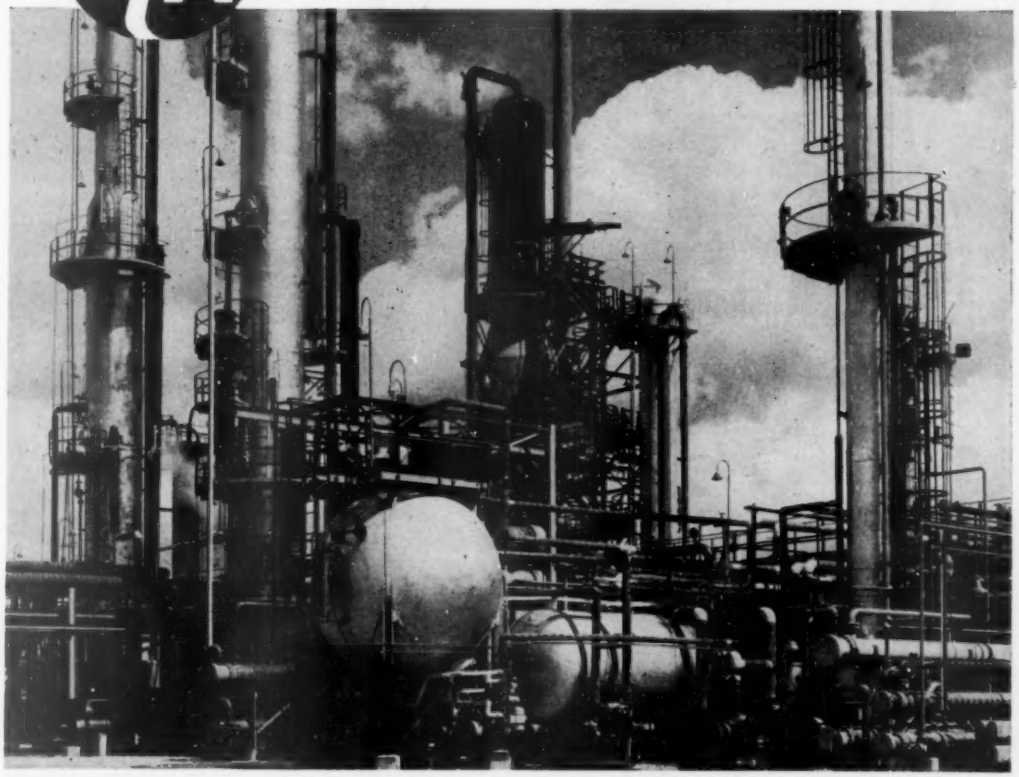
Radio-equipped trucks, carrying supplies or repair crew, can be dispatched rapidly to any spot on the line. Quick transfers of men or equipment cut maintenance costs.

In action less than a year, G-E radio system is already worth many times its cost to this pipeline management. Winter or summer, the radio units are unaffected by weather.

GENERAL ELECTRIC

THE BRITISH AMERICAN OIL COMPANY LIMITED

another leading refiner who desalts with PETRECO



At Edmonton, Alberta, The British American Oil Company Limited has recently put into service a complete new refinery. Intended to handle production from Canada's great western oil fields, this new British American installation incorporates the most modern developments in refining technology. Like other leading refiners everywhere, British American at Edmonton relies on Petreco for desalting.

The Petreco desalter illustrated above desalts 5200 barrels per day of Redwater crude, with salt removals ranging from 94% to 96%. The electrosphere is one of Petreco's new high-efficiency, high-throughput spheres, eleven feet in diameter.

PETRECO OFFERS COMPLETE DESALTING SERVICE AND FACILITIES

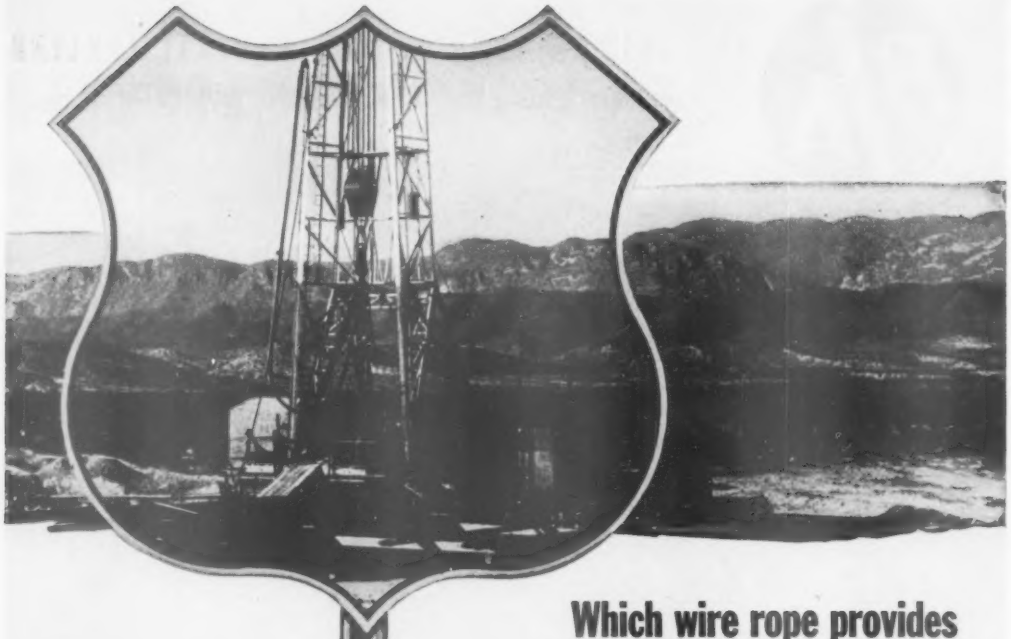
PETRECO DIVISION

3202 South Wayside Drive, Houston 3, Texas
1380 East Burnett Street, Long Beach 6, California

PETRECO

SPECIALIZED *Electric* PETROLEUM PROCESSES { DESALTING / DEHYDRATING

PR 52-2



BRODERICK & BASCOM

Yellow Strand®

PREFORMED WIRE ROPE

Which wire rope provides *a well-marked route* to sustained production?

Wire-rope users who get around know the answer to that. Like an unmistakable highway sign, the familiar yellow of Preformed Yellow Strand gives you confidence that you're headed where you want to go. The limberness of this kink-resistant rope contributes to a smooth run. Its toughness keeps a long interval between stops for checking or replacement. Most important, an installation recommended by our engineers is designed to bring out the true capacity of your equipment—and only working machines pay off. Let's talk over the possibility of stepping up your wire-rope service.

Broderick & Bascom Rope Co.
St. Louis 15, Mo.

Houston Factory and Branch: 9350 Market Street Road
Odessa, Tex., Branch: 3601 West Second Street
Los Angeles Branch: 2441 Hunter Street
San Francisco Branch: 899 Bryant Street

THE CONTINENTAL SUPPLY CO.
Mid-Continent Distributors — Stores in All Active Fields

McJUNKIN CORPORATION
Charleston, West Virginia, and Branches

8 TIMES the service

HANDLING REFINERY STEAM

ORDINARY hose used to handle 125 lb. working steam pressures in this refinery —occasionally in 24-hour service—failed after approximately 2 months.

G.T.M.—Goodyear Technical Man—recommended using Goodyear HD GLASS CORD STEAM HOSE. It served 17 months—proof that Goodyear job-design means longer hose service at lower over-all cost.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified HD GLASS CORD HOSE
for general refinery steam service
A
B
C
A Heavy-gauge, heat resistant tube remains soft and flexible at temperatures up to 388°
B Glass cord, "flexible-braided" body is nonscarring; handles pressures up to 200 lbs. psi.
C Tough, sturdy cover provides maximum protection

LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls built to the world's highest standard of quality.*

GOODYEAR

THE GREATEST NAME IN RUBBER

Production tool for stronger pipe

One of the most important tools used to make Basalt-Kaiser line pipe meet your rigid specifications is—*water!*

Large diameter Basalt-Kaiser pipe is clamped in steel dies and hydraulically expanded by water under great pressure to assure accurate diameter, concentricity and straightness.

Because of this additional cold working, Basalt-Kaiser pipe is further strengthened to fulfill your requirements for high yield strength.

And after the dies are opened, high pressure is maintained in the pipe while measured blows are struck along the seam to test the strength of the weld.

This is only one of the exacting tests Basalt-Kaiser pipe must pass before it is delivered to you. Another good reason why experienced line men know:

It's good business to do business with

Kaiser Steel

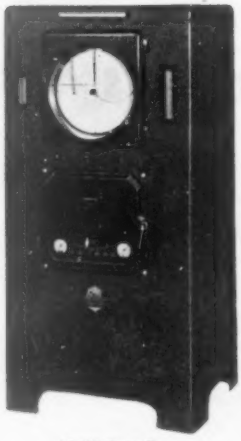
KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 53'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • **KAISER STEEL CORPORATION** Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

ACCURACY IN GAS TESTS

With the following AC-ME and R.S. Specialties accurate tests and measurements are guaranteed.



AC-ME Recording Gravitometer-Controller

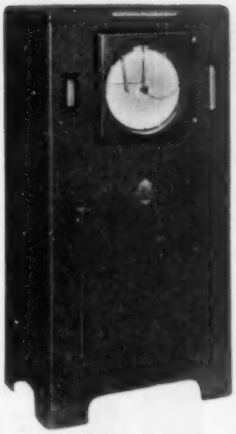
CEMENT TESTING INSTRUMENTS
Super Pressure Consistometer
Cement Curing Chamber
Cement Slurry Mixing Cells

CORE® TESTING INSTRUMENTS
Core Cutting Knife
Laboratory Core Drills
Porosimeter-Stevens Type
High-Pressure Flood Pots

GAS TESTING INSTRUMENTS
Recording Gravitometer
Specific Gravity Balance
Dew Point Tester
Super Compressibility Apparatus

DEAD WEIGHT INSTRUMENTS
Standard Dead Weight Gauge
Portable Dead Weight Tester

LIQUID TESTING INSTRUMENTS
Liquid Gravitometer
Vapor Pressure Bombs
Pressure Hydrometer Jar
Specific Gravity Bombs
Corrosion Test Bombs



AC-ME Recording Gravitometer

Write today for your copy Bulletin No. 50 Describing R.S. and AC-ME Testing Instruments.

R. S. Dead Weight Gauge

Large stocks of laboratory apparatus and supplies for oil and gas testing are available for your convenience.

Complete Line of Scientific Laboratory Equipment
Write for Bulletin No. 50
Also Complete line of CENTRAL SCIENTIFIC SPECIALTIES

CENTRAL SCIENTIFIC COMPANY
CHICAGO

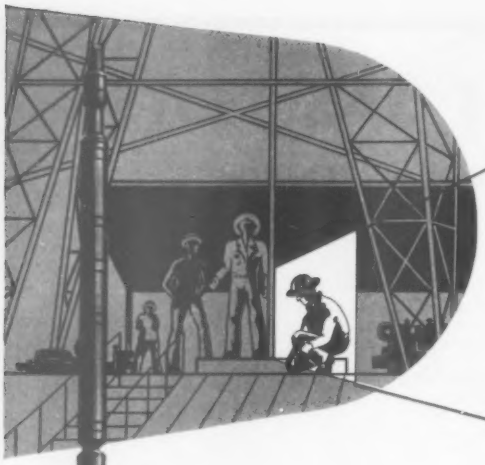
R.S.G. SERVICE ASSURANCE TULSA

REFINERY SUPPLY COMPANY CENCO

Laboratory Apparatus and Supplies *Oil and Gas Testing Equipment*

621-23 E. 4th St. Tulsa 3, Oklahoma

Houston Branch Office and Warehouse: 2215 McKinney Avenue, Houston 3, Texas



Responsible Specialists make HALLIBURTON'S TEST

One of Many Reasons Why Halliburton's Best for Your Drill Stem Test

You have a lot at stake when a tester's on the rig. You want a man who knows the importance of the job. You want a *responsible testing specialist!*

Your Halliburton Tester is hand picked from a field of high-calibre men. He is selected for his extraordinary responsibility, efficiency, and capability. Then he is carefully trained and thoroughly experienced on every type of well until he has earned the coveted title of Halliburton Testing Specialist.

Your Halliburton Tester stays on the rig from start to finish of the test — giving you his close, full-time, personal attention. He comes fully equipped with the most advanced and specialized tools in the industry to perform a safe, successful, accurate test on the very first run most of the time.

Halliburton has over a hundred responsible testing specialists. One of them is just minutes away and ready to go as soon as you call. Save rigtime, phone him before you come out of the hole. Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

MORE REASONS WHY HALLIBURTON'S BEST:

YOU GET BENEFITS OF BIG RESEARCH
Halliburton alone offers a testing service developed and improved by 25 years' energetic, grass-roots research.

GREATER ACCURACY IN PRESSURE RECORDING
Halliburton's exclusive Bourdon Tube — the most precise pressure recording device — gives you far greater accuracy at no extra cost.

YOU GET MILLION-JOB EXPERIENCE
There's no substitute for experience, and Halliburton alone offers you the enormous experience of service on more than a million jobs.

HALLIBURTON

YEARS AHEAD IN DRILL STEM TESTING!

Flexonics engineered for pressures up to 5500 psi!

The Flexonics Expansion Joint Design Guide offers helpful data on the selection and application of expansion joints for all services. Write for your copy, today.

With its Flexoniflex line of expansion joints, Flexonics Corporation offers the first practical, in-line expansion joint for high pressure piping systems. Depending upon size and temperature, Flexoniflex units will handle pressures from vacuum to 5500 psi. Temperatures from –400° F. to 1600° F. can be accommodated at reduced pressure at the temperature extremes. Sizes range from ½" pipe through 6" pipe. Consult Flexonics Corporation's Engineering Department for information on larger sized units.

In construction, Flexoniflex units consist of one or more plies of corrugated stainless steel with integral control rings. They are available with either flanged or welding ends.

If you have high pressure piping we would like to show you how Flexoniflex Expansion Joints can solve your expansion control problems.

Flexonics *Corporation*

FLEXON BELLOWS DIVISION
1345 S. THIRD AVENUE · MAYWOOD, ILLINOIS

FORMERLY CHICAGO METAL HOSE CORPORATION

Flexon identifies products of Flexonics Corporation that have served industry for over 50 years.

Manufacturers of Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals · Expansion Joints for Piping Systems · Stainless Steel and Brass Bellows · Flexible Metal Conduit and Armor · Assemblies of These Components

In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Here's the new

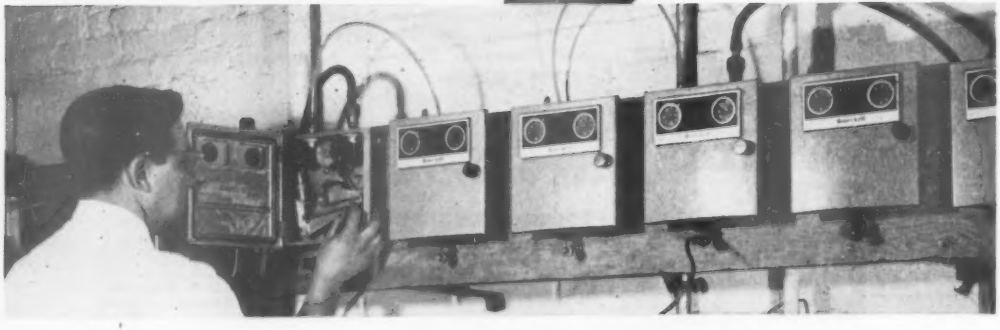
HONEYWELL PRESSURE

the **heavy-duty** controller

designed for accuracy at low cost

A look inside the Honeywell Pressure Pilot shows its simple design, rugged construction, and accessibility of all adjustments.

Every Pressure Pilot undergoes rigid inspection and testing before shipment.



PILOT

SPECIFICALLY designed for applications requiring accurate control where more expensive indicating or recording instruments are not warranted, the Honeywell Pressure Pilot is ideal for regulating pressure of separators, pump outlets, hydraulic systems, fluid transmission lines, cooling water lines, turbine oil, and furnace fuels.

The Pressure Pilot employs a Bourdon tube to detect line pressure changes . . . a flapper and nozzle assembly to provide a corresponding air signal pressure . . . and a pneumatic relay which amplifies the signal to position a diaphragm control valve.

Exceptional simplicity of design characterizes this new controller. Among its outstanding features are a convenient set point adjustment, unique overpressure safeguard, easy reversibility, and universal mounting.

For accurate control at low cost, for rugged construction, for dependable pressure control . . . your best buy is the Honeywell Pressure Pilot. Our local engineering representative will welcome the opportunity to give you a demonstration in your plant. Call him today . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1906 Windrim Ave., Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
VALVE PRODUCTS
First in Controls

● *Important Reference Data*

Write for new Bulletin 16-1, "Honeywell Pressure Pilot."

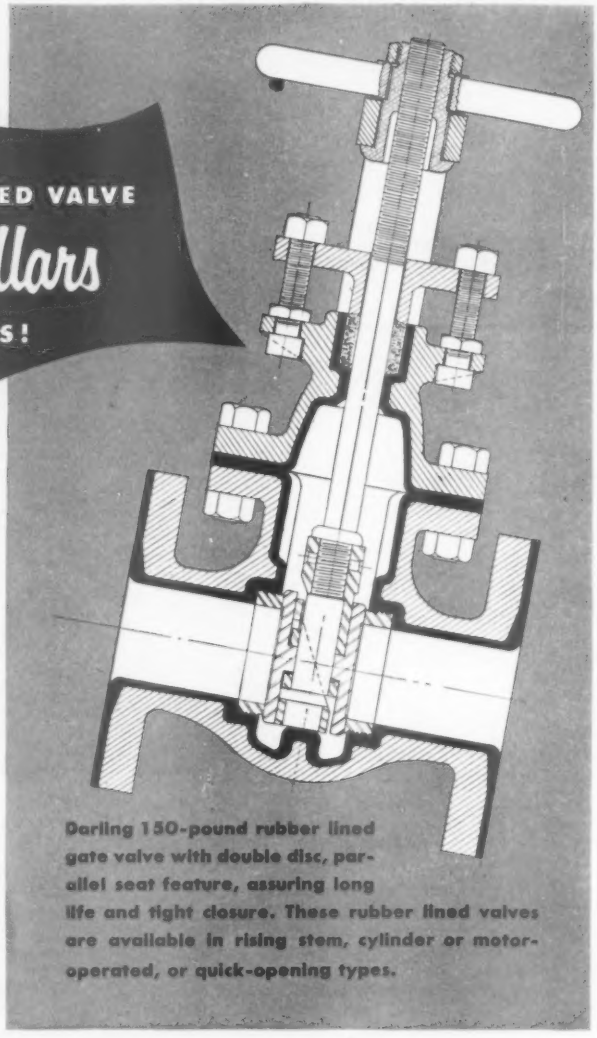
HOW THIS RUBBER LINED VALVE

stretches dollars

IN CORROSIVE SERVICES!

it's a **DARLING**

fully revolving double disc iron body gate valve



Darling 150-pound rubber lined gate valve with double disc, parallel seat feature, assuring long life and tight closure. These rubber lined valves are available in rising stem, cylinder or motor-operated, or quick-opening types.

IN many corrosive services up to 180° F, Darling hard rubber lined iron body gate valves are taking the place of costly special alloy valves . . . saving plenty of dollars!

And when it comes to year-in, year-out behavior, they can't be beat! A proved bonding technique permanently prevents separation of the hard rubber lining from the valve body. All interior working parts are made of alloys suitable for the corrosive conditions involved.

Equally important, these valves feature Darling's fully revolving double disc parallel seat principle. This, combined with the equalizing wedges, means easy, *tight* closure even if seats are not parallel due to line stresses. It means *uniform* distribution of wear for prolonged life with minimum maintenance cost.

SEND FOR DATA. A bulletin covering Darling rubber lined *gate* and *check* valves is yours for the asking. In addition, Darling parallel seat revolving disc gate valves are available in a wide range of sizes and constructions for all kinds of normal and unusual service, and for pressures up to 1500 pounds. We'll gladly furnish specific recommendations on the proper valves for your particular service.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

save a string of casing—with HALLIBURTON'S DV Multiple Stage Cementer

By using Halliburton's DV Cementer, you can isolate shallow zones without having to run a continuous column of cement across great distances in the hole. Frequently this can result in the elimination of one or more strings of casing!

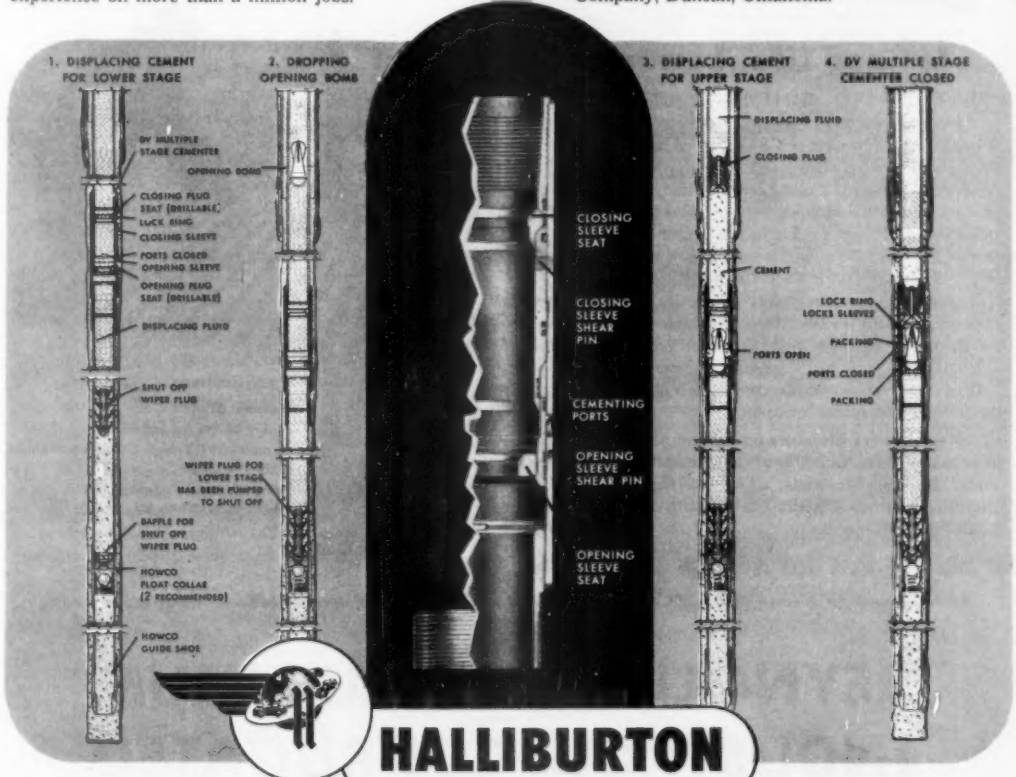
The growing importance of Halliburton's DV Cementer proves its advantages in actual use over a wide range of multiple stage cementing applications. These include full depth cementing, dual well completion, cementing off formations at any point, reducing channeling, reducing pump pressures, and preventing loss of slurry to formations.

Precision-built to withstand pressures beyond the collapsible strength of the casing, the "DV" assures safe, positive application in any well regardless of depth, pressure, or temperature. It was developed by Halliburton's 25 years research and improved by experience on more than a million jobs.

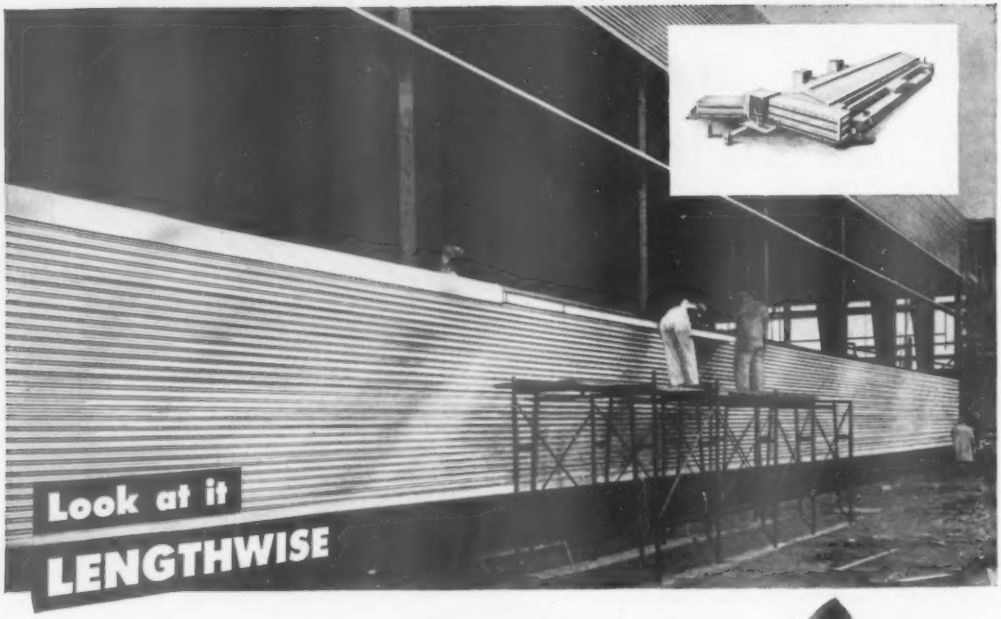
EXCLUSIVE DIFFERENTIAL VALVE ASSURES POSITIVE SHUT-OFF AT COMPLETION

Incorporating the differential principle of hydraulics, the Halliburton DV (Differential Valve) features two telescoping sleeves. The lower or opening sleeve seals tool ports during circulation and passage of cement for lower stage of job. The upper or closing sleeve seals off the tool ports after completion of upper stage. The closing sleeve is then held by means of a locking ring on the sleeve. In this position both sleeves are permanently locked together and to the lower member of the tool body. This prevents them from rotating during the drilling-out operation and provides a pressure proof seal across the ports.

Your nearby Halliburton representative will show you how this versatile tool saves time, money, and casing on any job which requires multiple stage cementing. Or write Halliburton Oil Well Cementing Company, Duncan, Oklahoma.



YEARS AHEAD IN CEMENTING SERVICE!



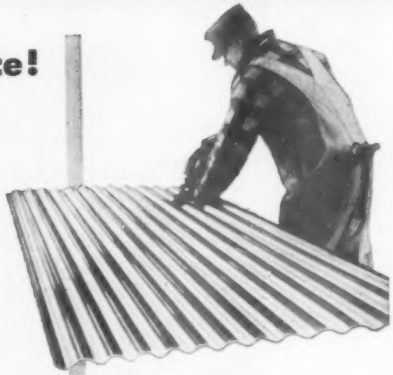
...Longer Life, Lower Maintenance!

When Hytron, Division of CBS, planned its new Danvers, Mass., plant, architects and clients agreed on Reynolds *Lifetime* Aluminum Industrial Corrugated for siding. Low initial cost, long life and lowest maintenance were practical factors. But the architects—R. P. Systems Engineers—sought a design effect, too. So they specified *horizontal* application. General contractor was L. R. Porter Construction Company.

Both as siding and as roofing (vertically applied) this material saves substantially on labor costs. It is light weight, easy to handle... workmen like it. In addition, aluminum reflects radiant heat ...keeps interiors up to 15° cooler in summer and warmer in winter.

Plan your next construction with this high-strength aluminum that never rusts, resists corrosion.

Call Reynolds for literature and technical assistance...offices in principal cities. Check your classified phone book for our listing under "Building Materials," or write to Reynolds Metals Company, Building Products Division, 2043 South Ninth Street, Louisville 1, Kentucky.



Specifications:

Thickness .032"
Weight 56 lbs. per square
Corrugations ⅞" deep, 2½" crown to crown
Roofing width 35", coverage 32"
Siding width 33¾", coverage 32"
Lengths 5', 6', 7', 9', 10', 11', 12'

Military demands for aluminum limit supply, but Reynolds is rapidly expanding aluminum capacity. Rated orders receive priority handling.

REYNOLDS *Lifetime* ALUMINUM INDUSTRIAL CORRUGATED

Safety is the primary function of good housekeeping in the petroleum industry. With the Multi-Clean Method it is a simple matter to have concrete floors which provide safe working conditions. They are kept bright and attractive by efficient mechanical maintenance which cleans up dangerous spillage and which provides a safeguard against explosion of air-borne fumes and dust.

The Multi-Clean Method Protects and Beautifies Concrete Floors

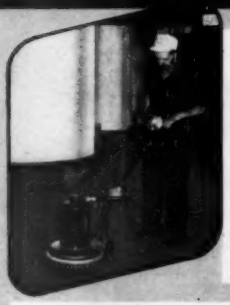
Multi-Clean Concrete Floor Hardener and Etcher conditions the floor surface for the application of Multi-Clean concrete finishes. It cleans, etches and hardens both old and new concrete floors, and prevents them from dusting or staining.

After this etching treatment, either Multi-Clean Neo-Dry Concrete Sealer or Multi-Clean Concrete Preserver are applied to produce a long-lasting finish that is easily cleaned and maintained with a minimum of time and effort. The bonding action of these finishes effectively stops any tendency of the floor to dust or chalk. Available in a wide range of colors, they are easily applied by inexperienced help.

Concrete floors maintained by the Multi-Clean Method are highly resistant to scuffing and wear, and unharmed by water, alkalis, oil and grease. They withstand heavy traffic, and points of exceptionally hard wear are easily touched up without showing lap marks.

Fill in the coupon at the right for your free copy of the Multi-Clean Maintenance Manual for concrete floors. It will show you how to have safer, longer-lasting, more attractive concrete floors, and how to save time and money in their upkeep.

MULTI-CLEAN®
PRODUCTS, INC.



MULTI-CLEAN *Explosion Proof* Floor Machine

New safety and efficiency are combined in the Multi-Clean Explosion Proof Floor Machine, which incorporates an explosion proof motor with other vitally essential safety features. All electrical components of this unit are approved by the Underwriters Laboratory. It quickly and safely eliminates slip hazards by removing grease, oil, chemicals and other dangerous materials.

THE MULTI-CLEAN METHOD OFFERS YOU TWO CONCRETE FLOOR TREATMENTS

Multi-Clean offers two concrete treatments formulated to meet your specific floor requirements. Floors treated with these special products are colorful, attractive, dust free, and easily cleaned and maintained. They are not to be classified as paints, since they penetrate deeply to provide a more durable protective medium.

Multi-Clean Neo-Dry Concrete Sealer is recommended where an extremely fast-drying, highly resistant finish is desired. It is a rubber-base treatment for areas where excessive acid, alkali or grease conditions prevail. It dries so rapidly that two coats may be applied and the floor opened to traffic within two hours if necessary. Multi-Clean Neo-Dry Concrete Sealer is available in Black, White, Green, Tile Red, Gray, Light Gray, Brown, and Natural.

Multi-Clean Concrete Preserver is a special bakelite formulation with high alkaline and traffic resistance. From 8 to 16 hours are required for drying between coats. This finish is very easy to apply. Multi-Clean Concrete Preserver offers outstanding beauty and protection for concrete floors at very nominal cost. Its color range is Tile Red, Maroon, Light Gray, Gray, Green, Brown, and Natural.

Every Multi-Clean Product Carries a 100% Guarantee

MAIL COUPON TODAY FOR FREE MANUAL!

MULTI-CLEAN PRODUCTS, INC.
2277 Ford Parkway, Dept. OG-7, St. Paul 1, Minn.

Gentlemen: Please send Multi-Clean Floor Manuals I have checked.

☐ ASPHALT TILE ☐ CONCRETE ☐ WOOD
☐ RUBBER TILE ☐ TERRAZZO ☐ LINOLEUM

Name _____

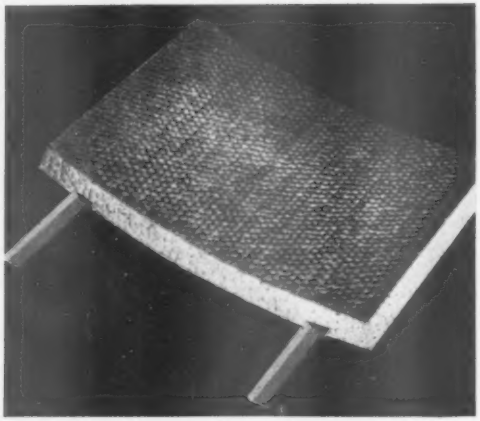
Firm _____

Address _____

City _____ Zone ____ State _____

8-51

"Never knew blocks could last so long!"



RAY-MAN 635-D BRAKE BLOCKS

In several of the nation's most active fields, Ray-Man 635-D Brake Blocks are making exceptional records for durability, even when handling the heaviest strings of pipe.

This durability means *lower costs*. In addition, Ray-Man 635-D Blocks feed off so smoothly and evenly that they speed drilling operations.

Each Ray-Man 635-D Block is woven of unusually large asbestos yarns. Strengthened with brass-wire-reinforced yarn in back. Fully impregnated with a specially developed saturant. Resists bleeding at high temperatures. Won't glaze drums. Won't carbonize even when heavily overloaded!

Key-Lok attachment, too! Key-Lok, the R/M development that makes it possible to *slide* blocks on and off, is optional with Ray-Man 635-D Blocks. This feature saves relining time . . . eliminates bolt holes, providing greater friction surface and longer wear. No danger of scoring drums with bolt heads. Also available drilled and countersunk for bolt attachment.

RAYBESTOS-MANHATTAN, INC.

WAREHOUSE STOCK: 2809 Taylor Street, Dallas, Tex.

OFFICES:

445 Lake Shore Drive, Chicago 11, Ill. • 4651 Pacific Blvd., Los Angeles 11, Calif.

Factories: **Bridgeport, Conn. • Manheim, Pa. • Passaic, N.J. • No. Charleston, S.C. • Crawfordsville, Ind. Peterborough, Ontario, Canada**

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings • Radiator Hose • Fan Belts • Mechanical Rubber Products • Rubber Covered Equipment • Packings • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

RM

Men who depend on power...know they can depend on CUMMINS®

Every CUMMINS DIESEL *is built not once but twice*

Oil field men have learned to count on Cummins Diesels for dependable power day in, day out.

What's behind this consistent reliability? One good reason is the fact that every Cummins Diesel is actually built *twice*. After initial assembly, and run-in testing, every engine is disassembled, inspected; then reassembled and tested again.

This extra care—together with Cummins' economy-proved fuel system and efficient parts and service organization—makes lightweight, high-speed (50-550 h.p.) Cummins Diesels a wise first choice *for men who depend on power*.

Whatever your power needs, whether it's for drilling, pumping, or hauling, portable power units or generator sets . . . or any other important jobs . . . your Cummins dealer is the man to see.

CUMMINS ENGINE COMPANY, INC., Columbus, Indiana

Export: Cummins Diesel Export Corporation
Columbus, Indiana, U.S.A. • Cable: CUMDIEX

CUMMINS DIESEL

TRADEMARK REG. U. S. PAT. OFF.

***Leaders** in lightweight, high-speed diesel power!*

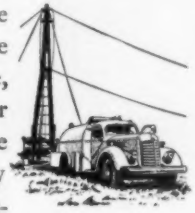
Time to light another candle...

It was 1802... 150 years ago... when Eleuthère Irénée du Pont de Nemours began making black powder in a fieldstone mill along the banks of Brandywine Creek near Wilmington, Delaware.

Research... experimentation... even then held a place of high concern in the development of a product soon known for its superior quality. From that humble beginning, so significant of the way of life in this new country, research has constantly played an important part in the colorful history of the Du Pont Company.

ONE HUNDRED YEARS passed. In 1902 . . . now half a century removed . . . Du Pont established Eastern Laboratory at Gibbstown, New Jersey. It was one of the first in the United States to be entirely devoted to industrial research. Here, old products were improved; new ones developed and perfected. And as always, consumers, technical representatives and the laboratory's chemists, physicists and engineers cooperated in the work. The keynote was progress. Today, such research has become an indispensable, integral part of Du Pont's continuing program of product improvement. Laboratory facilities now embrace over 75 buildings, a proving ground of some 3600 acres and an experimental tunnel and mine.

MANY INDUSTRIES have benefited from these untiring efforts. For example, the Du Pont Jet Perforator proved of outstanding value to the petroleum industry by helping increase the production of oil. Men now long engaged in oil exploration and producing fields may well recall the introduction of several other products of Du Pont Explosives Research. Among these many contributions to a basic industry are the following:



DU PONT PRODUCTS OF EXPLOSIVES RESEARCH

- Jet Perforators
- EL-389-B
- EL-431-A
- Special Oil-Well Explosive #1 and #3.
- Low-freezing Dynamites
- Ammonium Nitrate Dynamite
- Ammonium Nitrate Gelatins
- "Hi-Velocity" Gelatins
- Fast-coupler Cartridges
- Seismogel
- "Nitramon" S
- "Nitramon" WW
- Electric Blasting Cap Shunts
- Tetryl Caps
- "SSS" No-lag Seismograph Electric Blasting Caps
- Rubber Plugs in Electric Blasting Caps
- Plastic Insulation on Electric Blasting Cap Wires
- Shielded Shunts
- "SSS" Static Resistant Electric Blasting Caps
- Condenser Discharge Blasting Machine

BUT what is new today may become obsolete tomorrow, next week or next year. That is why the job of research never ends. And constant research is why Du Pont Explosives have earned world-wide recognition. For 150 years they have met the specialized needs of many different industries and of the men whose work requires dependable performance in a wide variety of products. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

Du Pont Explosives

Blasting Supplies and Accessories

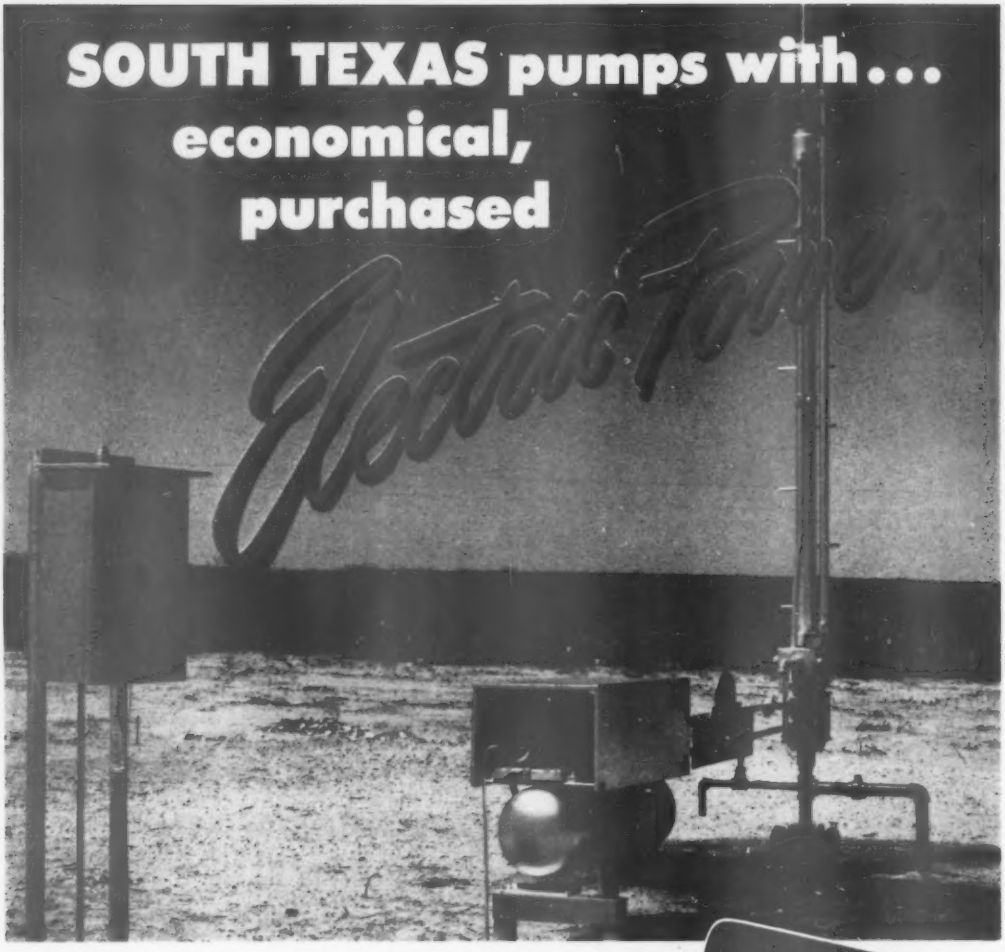
DU PONT

REG. U. S. PAT. OFF.

150th Anniversary

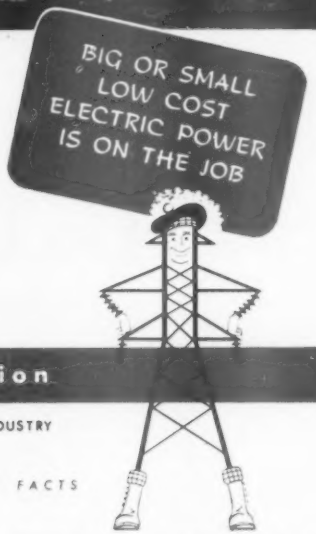
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

SOUTH TEXAS pumps with... economical, purchased Electric Power



Many South Texas stripper wells are being efficiently, profitably pumped by *PEP. The hydraulic pump shown above on location near Benavides, Texas, is situated in a field that is powered entirely by Electric Power. Automatic control . . . higher safety factor . . . maximum portability . . . low initial capital investment . . . and small operating, maintenance and labor costs are big advantages. Why don't YOU take advantage of these features? Contact the Power Engineer of your nearest Electric Power Company for details. Let *PEP go to work for you!

*PEP—Purchased Electric Power



Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

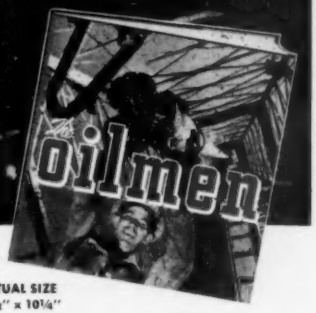
CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

IT'S YOUR INDUSTRY—IT'S YOUR STORY—
IT'S THE BOOK FOR YOU—

"The oilmen"

by Thomas Hollyman
—published by Rinehart & Company, Inc.



$1.50 ACTUAL SIZE 10½" x 10¼"

It's a book you'll use hundreds of times ...the picture story that captures the personality of an industry

● Consulting photographic editor of *Holiday*, and a contributor to other leading magazines, Tom Hollyman now turns his lens on *oil*—to tell its exciting story in terms of the industry's men and women.

Dramatically photographed, concisely written, cloth-bound and oversize, "The Oilmen" tells petroleum's full story from search to discovery . . . through production, refining, transportation, marketing . . . to the ultimate user's door. It's a book the industry has needed for years, a book that every man and woman associated with petroleum must see, read, own.

"The Oilmen," published by Rinehart & Company, Inc.

at all leading book stores—or send coupon

Shell Oil Company and its employees co-operated with Mr. Hollyman to make this picture story possible—and offer this announcement as a service to the men and women who have made oil the nation's No. 1 source of energy.

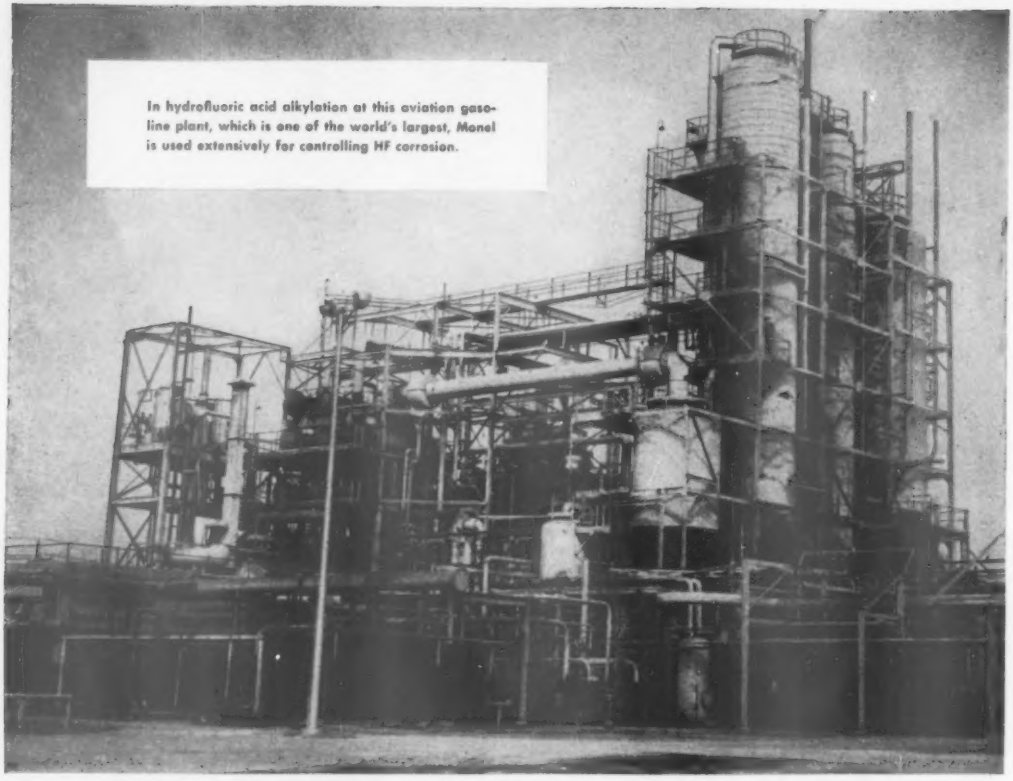
Rinehart & Company, Inc., Dept. 25
232 Madison Avenue, New York 16, New York

Please send me____copies of THE OILMEN @ $1.50.
I enclose check or money order in the amount of $____

Name _____

Address _____

_____



In hydrofluoric acid alkylation at this aviation gasoline plant, which is one of the world's largest, Monel is used extensively for controlling HF corrosion.

MONEL *for handling* HF *and* FLUORINE

Experience has proved that for maximum safety, and corrosion resistance, Monel® is among the most satisfactory materials of construction for handling fluorine and its more active compounds.

Monel is highly resistant to ignition by fluorine. It has been successfully used to handle fluorine at pressures up to 400 pounds per square inch, and has shown economical corrosion resistance at temperatures up to about 900°F.

Not only is Monel highly resistant to attack by fluorine, it also shows good corrosion resistance to anhydrous hydrogen fluoride and to steam-HF mixtures, even at temperatures as high as 1100°F. A proven practical application of these facts has been the established use of Monel in hydrofluoric acid alkylation units in petroleum plants.

In addition to excellent chemical characteristics are Monel's well-known physical properties...high strength ...easy fabrication and welding.

But remember, Monel is on extended delivery now because so much is taken for defense. In order to improve your chances of getting delivery when you need it, it's wise to place your orders — with necessary NPA rating and complete end use information — well in advance of your construction schedule. And if you have a special metal problem, Inco's Technical Service Section will be glad to help you solve it. Write today, giving full details.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N.Y.

INCO TRADE MARK

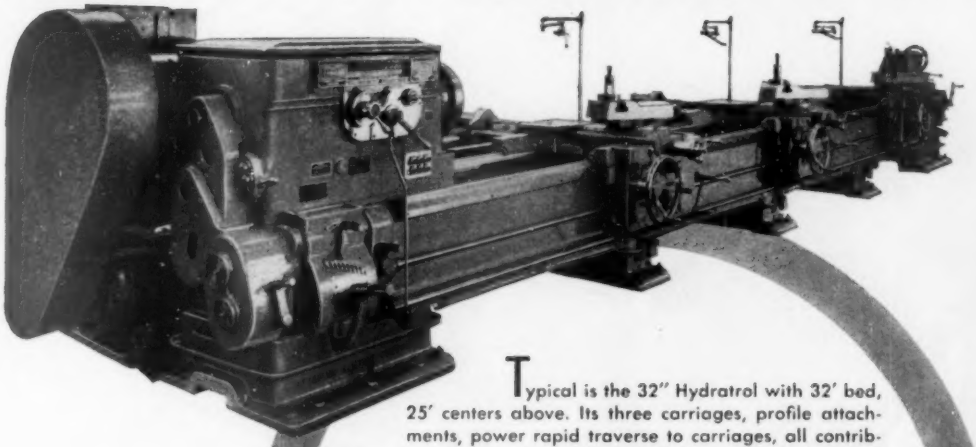
MONEL ... *for minimum maintenance*

Hydratrol Lathes

Again Helping Uncle Sam to Lower Costs and Increase Production!

LEHMANN'S VERSATILITY OF DESIGN

Machines Gun Tubes Better and Faster



Typical is the 32" Hydratrol with 32' bed, 25' centers above. Its three carriages, profile attachments, power rapid traverse to carriages, all contribute to doing the rough and finish turning of the O. D. on gun tubes better and faster.

CHECK THESE STANDARD FEATURES

- Hydraulically operated speed changes.
- Simplicity in construction, simplicity and safety in operation.
- Automatic Slide Rule indicates spindle speeds, operation numbers, cutting speed.
- Self-compensating hydraulic friction clutches and brakes.
- Speed changes through positive clutches, gears remaining in constant mesh.
- Spindle release for chucking.
- Perfect, safety control lubrication with filtered oil.

Six Sizes

Medium Duty 16"-18"
Heavy Duty 20"-25"
Heavy Duty 32"-36"
Heavy Duty 40"-50"

Lehmann
MACHINE COMPANY

CHOUTEAU AT GRAND • ST. LOUIS 3, MO.

Reports like this are as good as a blank check to operators in field after field

Ask Your Lane-Wells Man!

Operators in many fields have hailed this new Lane-Wells service as the greatest advance in well logging in fifteen years. Correlation and study of tens of thousands of Radioactivity Well Logs showed that quantitative interpretation was possible in many fields. Put into practice by Lane-Wells after thorough testing, quantitative interpretation assists in determining reservoir potential accurately enough for all commercial purposes. This method of evaluation has been strikingly successful in those areas where formation characteristics permit such interpretation.

We can report, now, that marked progress is being made. Wherever a series of painstaking tests shows that our interpretations can provide reliable data, this service will be provided. With our continuing studies, tests and correlations, quantitative interpretation is being made available to more and more of the country's major oil areas.

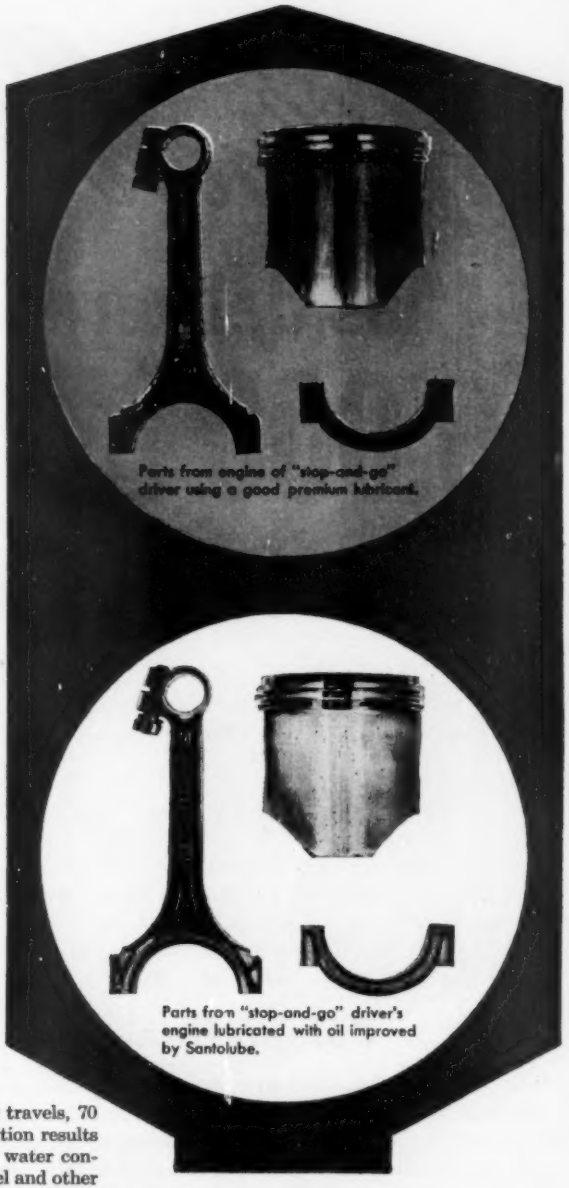
LANE WELLS *Tomorrow's Tools - Today!*

AR-507

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

Santolubes solve problem in "stop-and-go" driving



Parts from engine of "stop-and-go" driver using a good premium lubricant.

Parts from "stop-and-go" driver's engine lubricated with oil improved by Santolube.

Of every 100 miles that the average passenger car travels, 70 to 85 miles are "stop-and-go" driving. Such operation results in organic acids that cause high engine wear . . . water condensation that brings rust . . . partially oxidized fuel and other contaminants that build up deposits throughout the engine and cause excessive wear and oil consumption.

This problem of the "stop-and-go" driver can be solved by improving lubricants with Monsanto Santolube 388.

Compounding lubricants to fill the needs of "stop-and-go" driving is a joint project of the compounder and additive supplier. Why not let Monsanto help you? For complete details on the use of Monsanto Santolubes for "stop-and-go" driving, get in touch with MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

Santolube: Reg. U. S. Pat. Off.

SANTOLUBE

MONSANTO
CHEMICALS – PLASTICS

Serving Industry . . . Which Serves Mankind

Allison

has delivered

10,000 Tank Transmissions for National Defense!

TODAY, less than three years after the first production delivery, Allison has built and shipped 10,000 Torqmatic Transmissions for Army Ordnance vehicles.

These revolutionary cross-drive transmissions resulted from General Motors' long experience in the manufacture of heavy-duty transmissions and torque converters. They provide great mobility, maneuverability and easy control to America's tanks and other track-laying vehicles. Hydraulic gearshifting, steering, braking are combined in a single, compact unit. Operators in Korea say that tanks with these transmissions can "stop on a dime" and spin in their own length, with minimum driver fatigue.

Commercially—

Today, Allison continues to deliver to commercial manufacturers Torqmatic Converters and Transmissions using the same basic principles. The Allison Torqmatic Drives bring smoothness, flexibility and economy never before experienced to many types of heavy-duty equipment such as are shown below. Write for information.

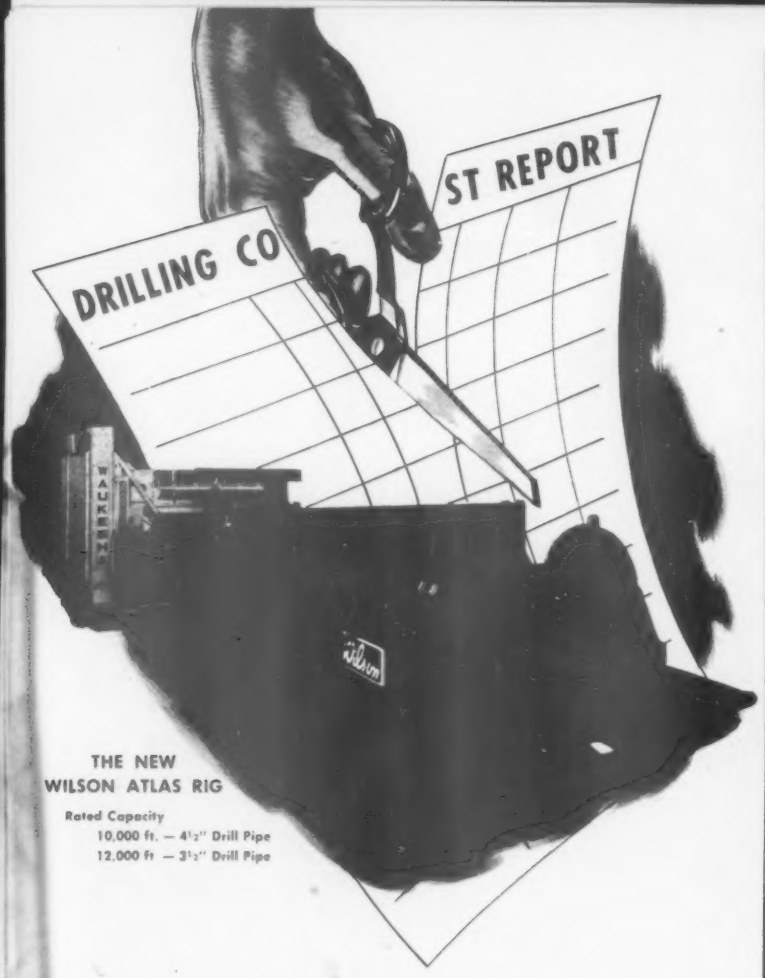
ALLISON DIVISION OF GENERAL MOTORS, *Box 894, Indianapolis 6, Indiana*

Illustrated is General Patton tank with cutaway view of Model CD-850 Allison Torqmatic Transmission

GM
GENERAL MOTORS

Allison

TORQMATIC DRIVES



THE NEW
WILSON ATLAS RIG

Rated Capacity
10,000 ft. — 4½" Drill Pipe
12,000 ft — 3½" Drill Pipe

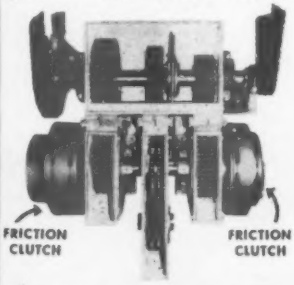
Wilson Rigs Cut Drilling Costs!

In today's Wilson rigs, Advanced Engineering makes it possible for the contractor to cut his overall Drilling Costs and make money in times of high labor and operating costs. Wilson rigs have been engineered for greater efficiency, faster operation plus a maximum of safety to crew. Downtime due to costly repairs has been reduced to an absolute minimum due to this same Advanced Engineering and to faster servicing from the Wilson Organization. A Wilson Rig continues to make money many, many years after it has paid for itself.

Compare FEATURES — QUALITY — COSTS

BIG FEATURES
OF WILSON RIGS!

★ **ALL FRICTION CLUTCH-CHAIN DRIVE TRANSMISSION** offers smoother, more efficient, more economical operation . . . plus less downtime due to trouble!



★ **AIR-OPERATED FULL VISION MASTER CONTROL PANEL** for added efficiency of Driller.. The best Control arrangement of any rig!

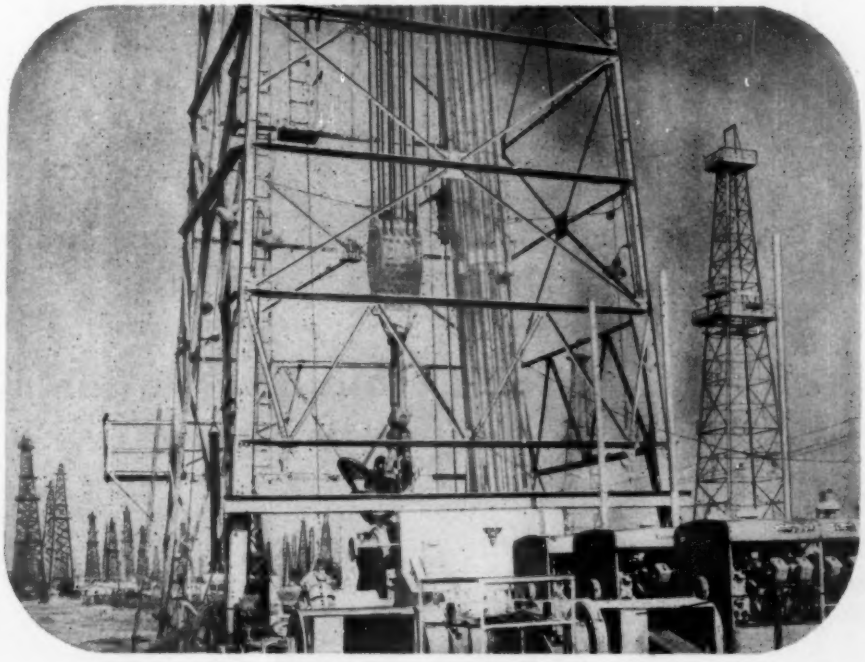
★ **SECTIONAL BOX-TYPE COMPOUND** to assure POSITIVE ALIGNMENT of engines at all times . . . reduces rigging up time!

★ **AIR-TUBE DISC CLUTCHES** — The World's Best — on all drives . . . provide faster operation!

Wilson MANUFACTURING CO., Inc.

WICHITA FALLS, TEXAS

WIRE ROPE



This is the most economical rope we've ever made for the oil fields

ROEBLING is the best known name in wire rope. That's partly because we were the first wire rope makers in America. But more than that, we've always led in developing better wire and better rope for every purpose.

Today's Roebling Preformed "Blue Center" Steel Wire Rope is the oil man's best choice for efficiency and long life. This rope has *extra* resistance to crushing and abrasion . . . stands up under rough going. It saves you time and cuts costs.

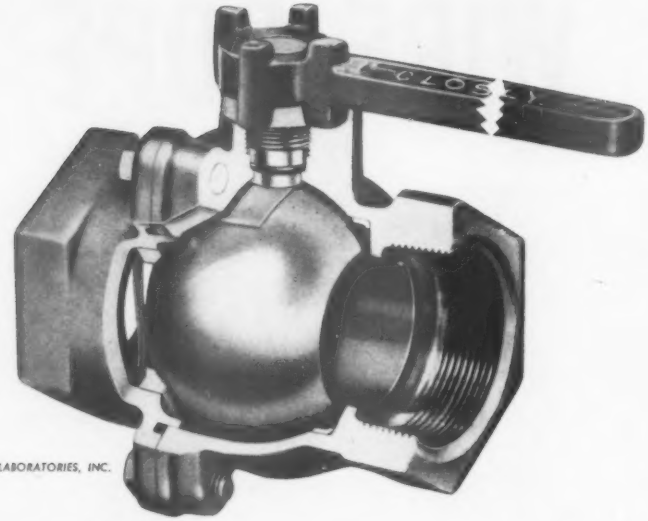
There's a Roebling wire rope of the right specification for top service on any job. Call on your Roebling Field Man for his recommendations . . . District Offices at Cleveland, Denver, Houston, Los Angeles, Odessa and Tulsa. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

DISTRIBUTED BY

THE NATIONAL SUPPLY COMPANY

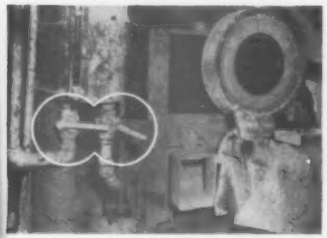
REPUBLIC SUPPLY COMPANY



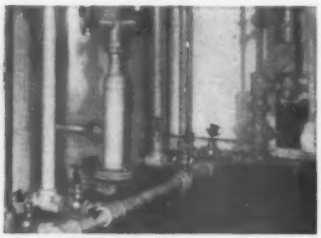
TESTED BY UNDERWRITERS' LABORATORIES, INC.

Breaking Records Throughout Industry!

FOR LONG LIFE . . . FOR ECONOMY . . . FOR SAFETY



Leading glass manufacturer reports Rockwood Ball Valves, operated 1500 times a day in a mixing process, were *only valves to stay in service over a year.*



Maintenance engineer of large gas company says: "Easy operation and no maintenance cost make Rockwood Ball Valves *far ahead of any others we have used.*"

On Texas transport firm's fleet of propane-butane trucks, the leakproof construction of Rockwood Ball Valves make them *safest for handling inflammable gases.*

Here's why Rockwood Ball Valves give you more of what you want in valve performance:

FULL ROUND FLOW . . . no change in shape or volume of the fluid stream . . . no turbulence . . . minimum friction loss.

QUICK OPENING AND CLOSING . . . needs only a quarter turn, even under full pressure.

RESISTS WEAR LONGER . . . scratching, pitting and abrasion have little effect on the chrome-plated, floating bronze ball.

STAYS LEAKPROOF . . . in closed position, pressure of fluid automatically positions ball against synthetic rubber seat to form a tight seal.

It will pay you to investigate how these advantages can benefit your own applications. Send for bulletin. Rockwood Sprinkler Company, 104 Harlow Street, Worcester 5, Mass. Distributors in all principal cities.

Some Prominent Users

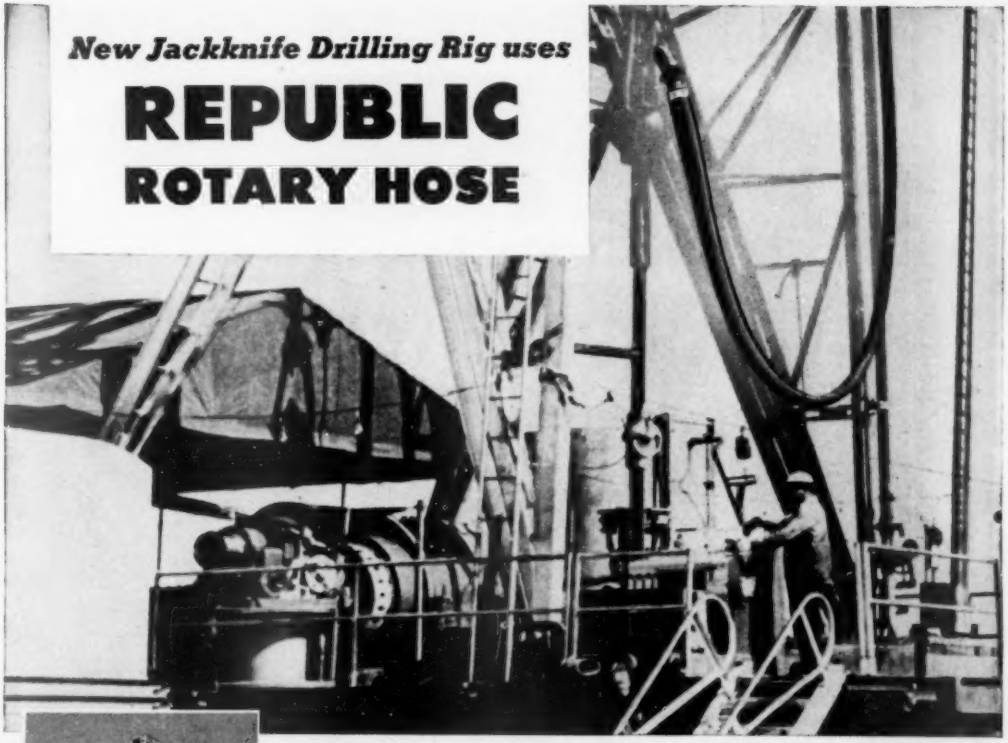
Libby-Owens-Ford Glass Co.
Revere Copper & Brass, Inc.
Bird Machine Co.
Remington Rand, Inc.
Hub Machine Co.
Daggett Chocolate Co.
Also approved by Und. Lab. for L. P. G.

ROCKWOOD *FULL-FLOW* BALL VALVES

THE FLOW IS AS ROUND AS THE PIPE ITSELF

New Jackknife Drilling Rig uses

REPUBLIC
ROTARY HOSE



This Wheland Company Jackknife Drilling Rig, completely outfitted with Republic Rubber Hose, is being operated by Dick Wegener, Drilling Contractor, near Duncan, Oklahoma.

for Champion performance always specify REPUBLIC

Republic's Champion Rotary Drilling Hose is the perfect choice for the new type drilling rigs now straddling the world's oil fields. These flexible carriers, made with steel reinforced oil-resistant Reprene, are designed to stand up longer under high, pulsating pressures. There are no bolts, flanges or protrusions of any kind to catch on the rigging, and the special flush-fitting, streamlined couplings, hydraulically locked into the hose carcass, will never leak or work loose. Champion Rotary Drilling Hose, a typical example of superiority in a highly specialized product, is one of many Republic Rubber Products specifically designed for oil country service. Your local Republic Distributor can show you many places where a slight difference in hose or belting can make a tremendous change in your operational economy and efficiency. Contact him today, or write direct for full facts.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

MID-CONTINENT DISTRIBUTORS

Jones & Laughlin Supply Company, Tulsa, Oklahoma
The Bovaird Supply Company, Tulsa, Oklahoma

WEST COAST DISTRIBUTORS

Hendrie Belting & Rubber Co., 405 Towne Ave., Los Angeles, Calif.
Pacific Coast Rubber Company, 51 Main St., San Francisco, Calif.

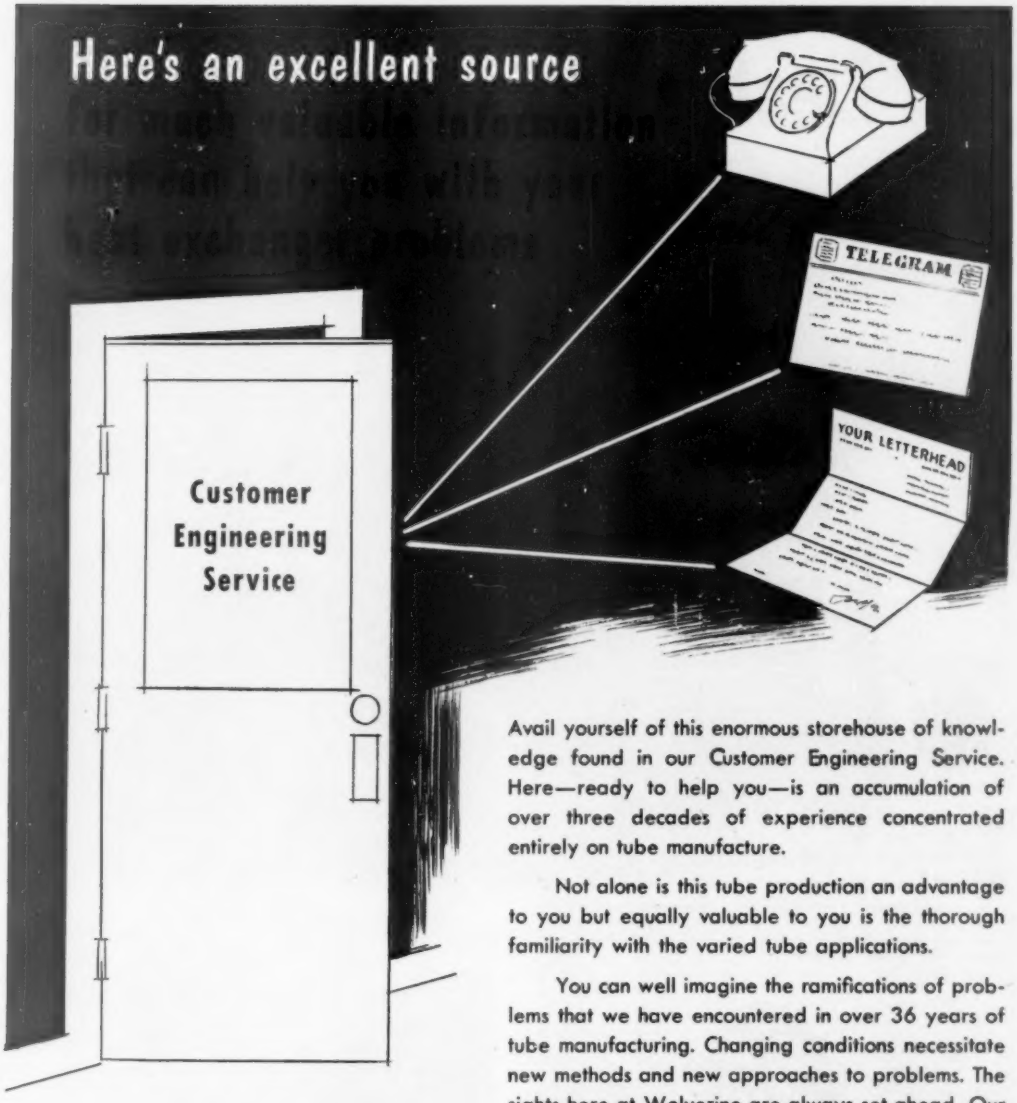
Keeping pace with the needs developed by Canada's expanding oil industry, we at Dominion Bridge have expanded our own plants and facilities . . . particularly in oil producing areas.

For almost any type of fabricated structural steel and platework —used in refinery or field operations, remember the name: DOMINION BRIDGE.

DOMINION BRIDGE COMPANY LIMITED

Divisions:
WAREHOUSE · STRUCTURAL · BOILER · MECHANICAL · PLATEWORK
Plants at: MONTREAL, OTTAWA, TORONTO, WINNIPEG, CALGARY, VANCOUVER
Assoc. Companies at: AMHERST, QUEBEC, SAULT STE. MARIE, EDMONTON

Here's an excellent source



Avail yourself of this enormous storehouse of knowledge found in our Customer Engineering Service. Here—ready to help you—is an accumulation of over three decades of experience concentrated entirely on tube manufacture.

Not alone is this tube production an advantage to you but equally valuable to you is the thorough familiarity with the varied tube applications.

You can well imagine the ramifications of problems that we have encountered in over 36 years of tube manufacturing. Changing conditions necessitate new methods and new approaches to problems. The sights here at Wolverine are always set ahead. Our technicians are always ready for you with the best answers that will improve your efficiency in operation.

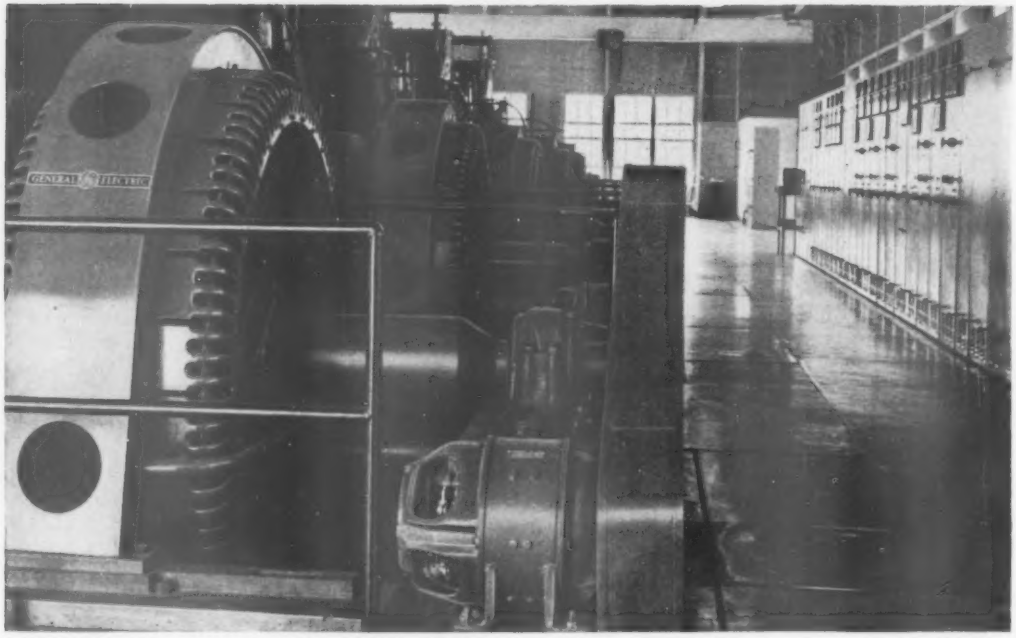
Let us relieve you of some of the problems dealing with heat exchangers, condensers, etc.

WOLVERINE TUBE DIVISION
Calumet & Hecla Consolidated Copper Company
INCORPORATED
Manufacturers of seamless, nonferrous tubing
1459 CENTRAL AVE. · DETROIT 9, MICH.

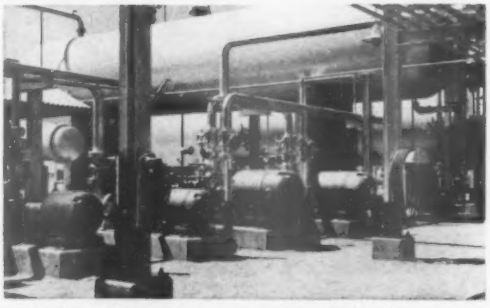
PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA
Sales Offices in Principal Cities

Export Department, 13 E. 40th St., New York 16, N. Y.

Electrically co-ordinated for efficient gas stripping!



Supplying all power for Stanolind's North Cowden plant are these five G-E gas engine-driven 800-kw a-c generators, with provision made for three more when needed. Power plant also includes (right) the main G-E 4160-volt metal-clad switchgear.

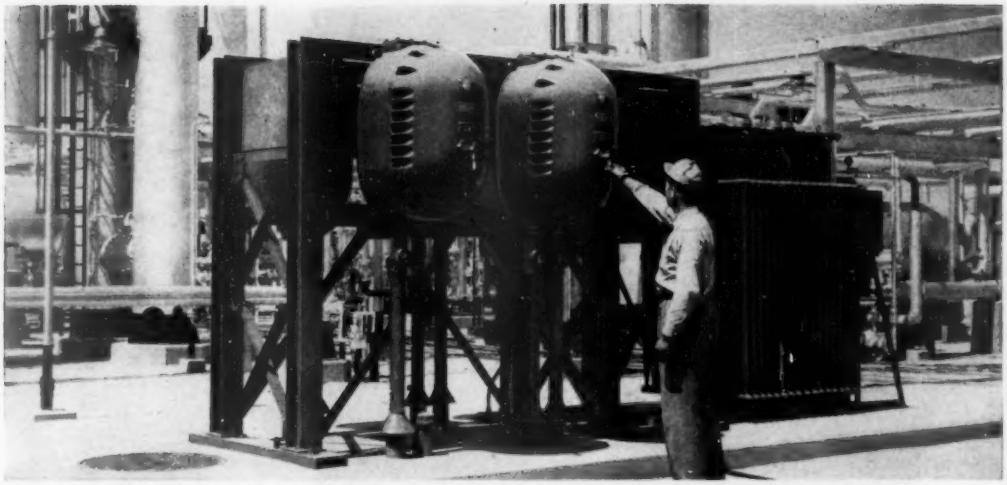


In hazardous refinery areas, use of explosion-proof motors—like these four G-E Tri-Clad* explosion-proof units at North Cowden—eliminates need for specially constructed rooms, permits locating motors for convenience and space economy.

Co-ordinated
ELECTRIC EQUIPMENT
for Gas Repressuring and Natural Gasoline Plants

Increase your workers' efficiency with General Electric's new Motor Selection and Application Course. A G-E "More Power to America" program, it gives the essentials on motors in 9 easy-to-take lessons. Bulletin GEA-4938-16 describes the course in detail. Write for it—now!

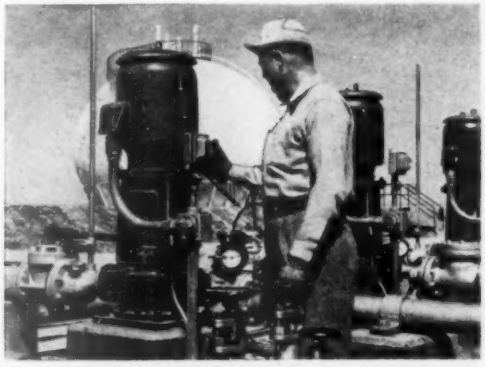
*Reg. trade-mark of General Electric Co.



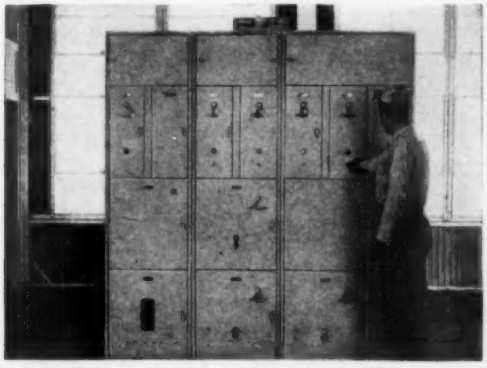
For high service continuity, eight G-E 500-kva load-center substations serving low-voltage circuits are arranged for secondary selective operation. In hazardous areas, substations are equipped with explosion-proof breakers as shown here.

New G-E equipped gas repressuring plant maintains continuous output in processing separator gas

Stanolind Oil and Gas Company's gasoline plant at North Cowden, Texas, is designed to efficiently process 100 million cubic feet per day of separator gas (now equipped for 50 million cubic feet per day) for the recovery of 300,000 gallons daily of propane, butane, and gasoline. Part of its efficiency is due to the electric apparatus supplied by General Electric, co-ordinated throughout by close engineering co-operation with Stanolind and its contractors. Ask your G-E representative how *your* refinery's electrical needs, too, can be met by G-E's skill in application engineering and project co-ordination. *General Electric Co., Schenectady 5, N. Y.* 661-35



To meet refinery conditions, G.E. builds an extremely wide line of explosion-proof equipment. These three G-E 15-hp explosion-proof vertical motors, for example, are also equipped with explosion-proof Start-Stop push buttons.



In non-hazardous areas, refineries favor grouping low-voltage motor controls for easier maintenance, as with these G-E 440-volt Cabinetrol* units at North Cowden. Compact and standardized, they save space, cut installation costs.

GENERAL ELECTRIC

Whether you want one worm-gear speed reducer or a thousand, a standard drive or a unit designed to meet your special problems, Cleveland is prepared to serve you. Meeting the most difficult requirements of machinery manufacturers and users is Cleveland's everyday business.

Just off press... FREE for your asking

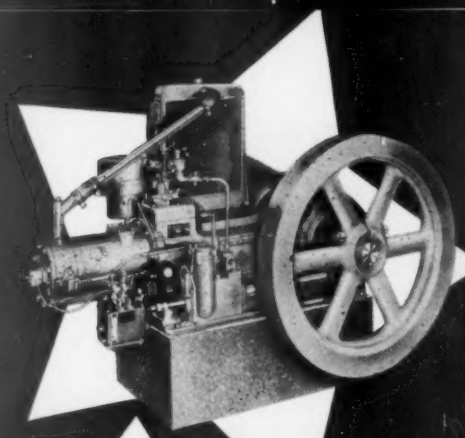
YOU'LL find first aid in this new Cleveland catalog —whenever you have to select worm gearing or an efficient worm-gear speed reducer.

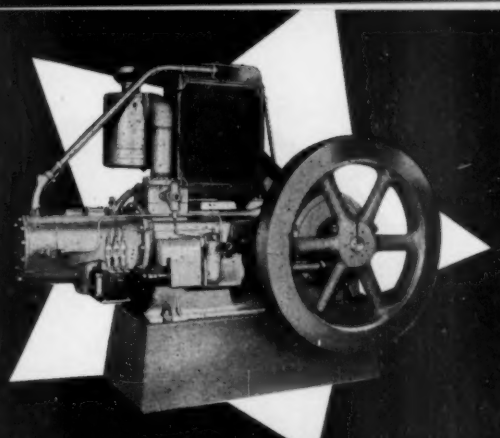
Catalog 400 replaces our old Catalog 200. Its 180 pages illustrate and describe each model in the complete line of Cleveland Worm Gear Speed Reducers. It contains engineering data on each type, including dimensions, weights and horsepower capacities—all the information you need to arrive at proper selections of drives for any equipment.

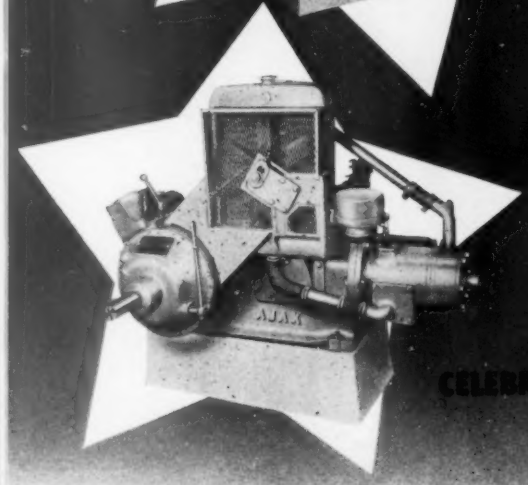
Over a year in the making, Catalog 400 is now available to all our customers. If you can use one in your work of designing power-driven equipment, or selecting speed reducers for new or old machines, just drop us a line on your letterhead.

The Cleveland Worm and Gear Co., 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.







Ajax

CELEBRATING **75 years**

OF ENGINE PRODUCTION FOR THE OIL INDUSTRY

with the finest
GAS ENGINES ever built

Three-quarters of a century devoted to building engines that satisfy the most exacting customers in the world—the American oil producers—have placed Ajax in a position of leadership imposing accepted obligations for continued steady progress. ● You'll find today's Ajax Gas and Oil Engines the finest ever built. ***Let your Supply Man give you the facts!***

LEADERSHIP
1877 1952
Ajax
GAS AND OIL ENGINES

AJAX IRON WORKS

Manufacturers of Gas Engines • Steam Drilling Engines • Industrial Steam Engines

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., TOLEDO, OHIO
R. B. MOORE SUPPLY CO., INC., BOLIVAR, N. Y. • BETHLEHEM SUPPLY CO., TULSA, OKLA.

Oil makes him a skilled worker . . .

This man operates a valuable precision machine. There are thousands like him in America. The need for their skill developed along with the creation of countless precision machines. And petroleum progress helped make these machines possible. Their very existence depends on the fine lubricating oils that ease and cushion the movements of their many intricate parts.

The Texas Company is proud of its part in the continuing development of fine lubricants that serve American industry.

The Texas Company

TEXACO

Faithfully yours 1902 | *for Fifty Years* 1952

One Call for Your Metal Needs!

SAVE TIME AND TROUBLE WITH ONE-CALL BUYING FROM COMPLETE WAREHOUSE STOCKS OF ALL AVAILABLE METALS

Give yourself and your company the full benefit and big convenience of *"one-stop"* buying of metals from Metal Goods Corporation. You'll simplify metals purchasing a lot by calling on our nearest representative. You can rely on us to supply your requirements correctly, completely and quickly. We maintain seven well stocked warehouses and eleven sales service offices to serve your needs. Many metals users are making very profitable use of Metal Goods Corporation service. May we help you?

Please call, wire, or write the following Metal Goods Corporation representative nearest you.

OFFICES AND WAREHOUSES

St. Louis 15, Missouri
5239 Brown Avenue
Nelson L. Hower
Phone: GOodfellow 1234

Kansas City 16, Mo.
1300 Burlington
Frank D. Hogan
Phone: NOrclay 3516

Tulsa 3, Oklahoma
302 North Boston
Scott J. Harrison
Phone: 4-1175

Houston 3, Texas
711 Milby Street
Harris T. Gregg
Phone: CEntral 8881

Denver 2, Colorado
2425 Walnut Street
Neal Dehn
Phone: AComa 5891

Dallas 9, Texas
6211 Cedar Springs Rd.
Sam D. Hodgdon
Phone: ELmhurst 3271

New Orleans 12, La.
432 Julia Street
Carl T. Wedemeyer
Phone: CAnal 7373

SALES SERVICE OFFICES

Wichita, Kansas
2200 East Central
Ray Noller
Phone: 7-8921

Jackson, Mississippi
781 Raymond Road
George E. Akerberg
Phone: 5-2711

Decatur, Illinois
1305 West Sunset
Arlie W. Tempel
Phone: 8-1314

Baton Rouge, Louisiana
4419 Mimosa Street
Paul P. Vidovic
Phone: 4-4738

Indianapolis 2, Ind.
1333 N. Pennsylvania
Harry L. Newton
Phone: Lincoln 4980

Memphis, Tennessee
713 Columbian Mutal Tower Bldg.
Robert W. Downs
Phone: 5-8721

Omaha, Nebraska
3515 No. 67th Avenue
C. M. Cooley
Phone: Walnut 1112

Beaumont, Texas
238 Bowie Bldg.
Lee T. Dodson
Phone: 4-7536, 4-7537

Fort Worth, Texas
3821 Caralyn
John M. Turbitt
Phone: FOrtune 4369

San Antonio, Texas
2012 Alamo Natl. Bldg.
Roy D. Bagaley
Phone: GArfield 3161

Davenport, Iowa
924 State Street
Robert L. Tharp
Phone: 2-3156

METAL GOODS CORPORATION

GENERAL OFFICES: ST. LOUIS 15, MISSOURI

Make Welding Skill Count

Use OXWELD Trade-Mark Welding Rods →

This unretouched picture shows the clean puddle formed by OXWELD *No. 1 H. T. steel rod . . . free of dirt, seams, and inclusions.*

Even the best operators must use good welding rods to make good welds. To make skill and experience count, a good welding rod is essential.

OXWELD rods insure clean, strong welds. They're developed by welding engineers who supervise every step in their manufacture. Careful testing insures that every rod measures up to OXWELD standards before it leaves the factory. And only rods that pass these rigid tests are marked with the OXWELD label.

There are OXWELD rods for steel, cast iron, wrought iron, copper, bronze, aluminum, and most alloys. Use them on your next job and notice the difference.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 E. 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

All OXWELD Welding Rods
Must Pass These Rigid Tests

Chemical Analysis Test—OXWELD rods must contain specified elements in the exact amounts called for in metallurgical formulas.

Cleanliness Test—OXWELD rods must be chemically clean and free from impurities.

Flame Test—OXWELD rods must flow easily and be free of dirt, seams, and inclusions.

Welding Test—OXWELD rods must unite readily with the base metal . . . good penetration must be obtained easily.

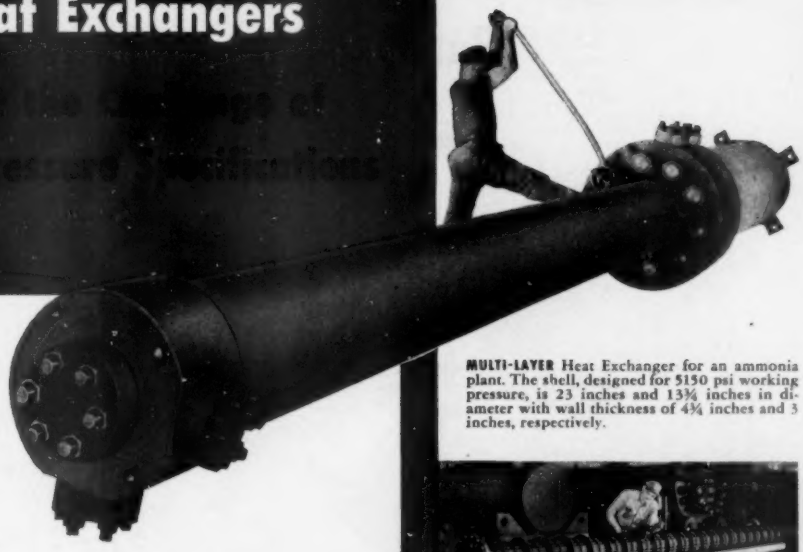
Physical Test—OXWELD rods must measure up to the minimum requirements of tensile strength, ductility, and fatigue resistance.

Oxweld Trade-Mark

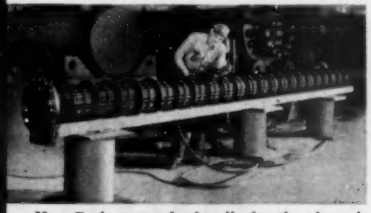
WELDING RODS and SUPPLIES

The term "Oxweld" is a registered trade-mark of Union Carbide and Carbon Corporation.

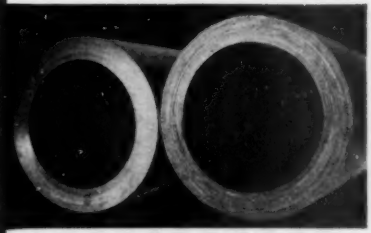
A.O.Smith Multi-Layer Heat Exchangers



MULTI-LAYER Heat Exchanger for an ammonia plant. The shell, designed for 5150 psi working pressure, is 23 inches and 13¾ inches in diameter with wall thickness of 4¾ inches and 3 inches, respectively.



Heat Exchanger tube bundle for the above is designed to take advantage of low differential operating conditions within an exchanger designed for 5150 psi chemical process.



MULTI-LAYER shell courses showing wall of concentric layers of steel plate. End at right has wrapping completed; at left, machined and scarfed for welding to next course or closure.

Remarkable flexibility of design and manufacture makes A. O. Smith MULTI-LAYER Heat Exchangers adaptable to a wide range of high-pressure services.

MULTI-LAYER Heat Exchanger shells are built up from concentric layers of relatively thin steel plate progressively wrapped, tightened and welded together around an inner pressure-tight cylinder.

Wrapping tension and weld shrinkage develop desirable compression in the inner layers of the shell during manufacture. This results in more equalized loading of all portions of the heat exchanger wall under working pressure. Thus, the full calculated strength of the steel is more completely utilized.

End closures to suit any operating condition are designed by engineers who draw on accumulated A. O. Smith experience in manufacturing more than 6,000 MULTI-LAYER vessels of various types and for pressures up to 10,000 p.s.i.

Where corrosion is a problem, only the inner shell need be made of corrosion-resistant materials. The load-bearing portion of the vessel wall—since it is not in contact with corrodents—can be manufactured of more economical and readily weldable steel plate.

This feature, alone, frequently effects substantial savings over the cost of solid alloy construction and is especially advantageous during the current restrictions on use of certain alloy materials.

Call upon A. O. Smith for assistance on your heat exchanger problems. Write the nearest office or use the handy coupon.

A.O.Smith

VESSELS • HEAT EXCHANGERS

Chicago 4 • Cleveland 15 • Dallas 2 • Denver 2 • Houston 2 • Los Angeles 22
Midland 5, Texas • New Orleans 12 • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • Tulsa 3 • Washington 6, D.C.
International Division: Box 2023, Milwaukee 1

A. O. Smith Corporation
Dept. OG-752, Milwaukee 1, Wis.

Without obligation, send me bulletins and information on your MULTI-LAYER Heat Exchangers and their construction features.

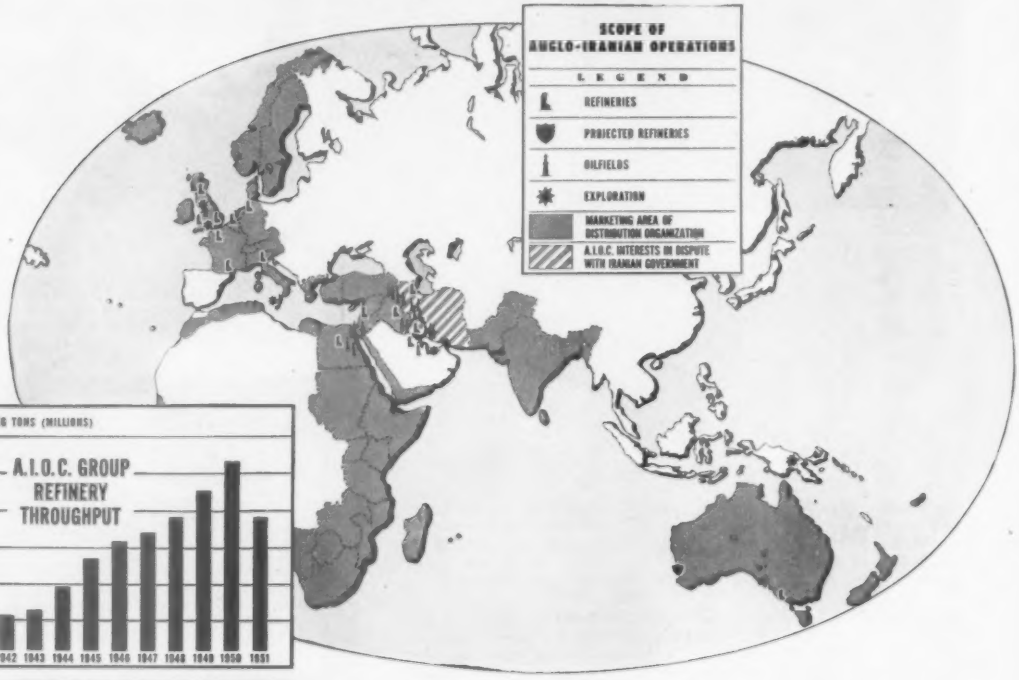
Name_____

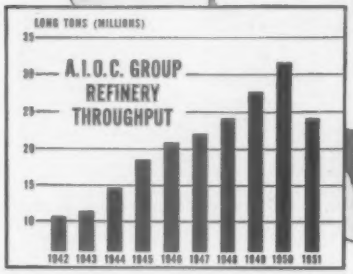
Address_____

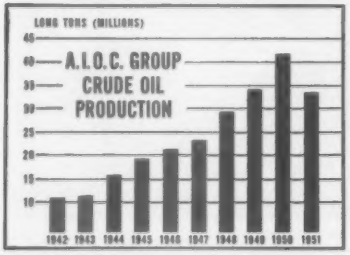
Firm_____

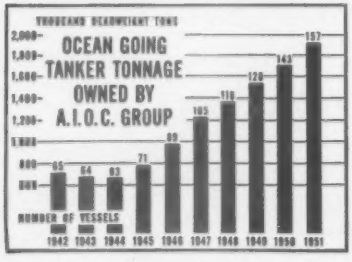
City_____

Facts from Anglo-Iranian Annual Report for 1951 Highlight Operations of a Difficult But Constructive Year









Events in Iran in 1951 deprived Anglo-Iranian Oil Company Ltd.—and the rest of the world—of 116 million barrels of oil in the last half of the year. But Iran, despite its importance in oil production and refining output, represented only a portion of Anglo-Iranian's widespread operations in many parts of the world.

What the Company is doing to expand production, exploration and refining elsewhere is described in these highlights from the Chairman's Statement to Stockholders—a report of progress during Anglo-Iranian's toughest, but, in many respects, its most resourceful year.

Distribution and Sales

Although events in Iran deprived the Company of some 116 million barrels of supplies from that source, its sales for the year declined by only 15 million barrels from the 1950 total of 288.7 million barrels.

Largely increased supplies of crude oil from Kuwait, Iraq and Qatar have more than offset the discontinuance of crude oil exports from Iran.

The increased supply of refined products from Anglo-Iranian's refineries and from processing arrangements made with other refiners cannot, however, meet its marketing requirements. The Company will continue to supplement its own supplies of products by purchases where it can do so on satisfactory terms, thus using every endeavor to conserve both

BP

ANGLO-IRANIAN

BRITANNIC HOUSE • FINSBURY

its good will and a sound trading position until such time as the provision of further refining facilities enables the Company once again to go forward and expand its business as in the past.

Expanded Crude Oil Production Outside Iran

Compared with 1950 there was an increase in 1951 of 140,000 barrels per day from the Company's share of production in Kuwait, Iraq and Qatar. During 1952 Anglo-Iranian's supplies from these three sources are expected to be about 534,000 barrels per day compared with 342,000 barrels per day in 1951.

Increased Exploration

The Company's exploration activities continue in various parts of the world . . . in Papua in partnership with American and Australian interests two deep wells were drilled . . . in Nigeria, where the Company is in partnership with the Shell group, the first deep well was started during the year . . . in Trinidad, Anglo-Iranian has a holding in Trinidad Northern Areas, Ltd., now preparing to make a seismic survey of the Gulf of Paria . . . and in Sicily, geological and geophysical work is being carried out in concession areas.

Refining Increased Outside Iran

The refinery throughput of the Anglo-Iranian group of companies declined from approximately 650,000 barrels a day in 1950 to 480,000 barrels a day in 1951, as the result of shutting down the Abadan refinery in Iran which had processed 91.5 million barrels of crude oil up to July, when operations ceased, as compared with 180 million barrels in 1950. The Company's refining operations in other countries were considerably expanded.

Capacities of its refineries in Great Britain, France, Italy, Belgium and Germany are being increased by 117,000 barrels a day during 1952. A new refinery is to be built in Australia with a capacity of 62,000 barrels a day.

Transport

The Company's tanker fleet numbers 155 ships of 1,950,000 deadweight tons. There remain under construction or on order 21 ships totalling 426,000 deadweight tons. Anglo-Iranian has on charter about 2,000,000 deadweight tons of shipping, more than half fixed for several years ahead.

Middle East Agreements

New agreements have been negotiated affecting the Company's principal interests in the Middle East other than Iran. Profits arising from operations within Iraq (where Anglo-Iranian has a 23¾% interest in the Iraq Petroleum Company group) will be shared equally with the Iraq Government. The Ruler of Kuwait will receive one half of the profits from the operations in his country of the Kuwait Oil Company, which Anglo-Iranian owns jointly with an American associate. These agreements follow the pattern now generally accepted for oil concession agreements in the Middle East.

World Bank Mediation in Iran

Efforts by the International Bank for Reconstruction and Development to assist in settling the differences between the British and Iranian governments and to set up a temporary management for the operation of Anglo-Iranian's Iranian oil properties resulted in failure to reach agreement with Iran. In its position as a neutral intermediary, the Bank was unable to accept the proposal of the Iranian government that it act for Iran's account. The Bank also felt that it would be inconsistent with the Bank's international character to agree to exclude British technicians from employment as demanded by the Iranian government. In addition, no conclusion was reached with Iran about the question of prices at which oil might be sold by the Bank. The Bank, however, informed both the Iranian and British governments that it would be ready to assist in working out any practical suggestion offering a reasonable prospect of success.

FINANCIAL SUMMARY for 1951

Profit Before United Kingdom Taxation.	£52,217,016
Net Profit After Taxes.	£24,233,050
Appropriations to Reserves	£17,000,000
Dividends in Respect of 1951	£ 7,112,484

(including recommended final dividend)

Copies of the Annual Report and Accounts may be obtained from the Company's representative in U. S. A., Mr. W. D. Heath Eves, 610 Fifth Avenue, New York 20, N. Y.

OIL COMPANY, LIMITED

CIRCUS • LONDON • E.C. 2

PRINCIPAL ALLIED AND SUBSIDIARY COMPANIES OF ANGLO-IRANIAN OIL COMPANY GROUP

Incorporated in United Kingdom

BP (ADEN) LIMITED.
BP (AEGEAN) LIMITED.
BP (AUSTRALIA) LIMITED.
BP (INDIA) LIMITED.
BP (PAKISTAN) LIMITED.
BP OF GREECE LIMITED.
BASRAH PETROLEUM COMPANY LIMITED.
BRITANNIC ESTATES, LIMITED.
BRITISH PETROLEUM CHEMICALS LIMITED.
BRITISH TANKER COMPANY, LIMITED.
CANDLES, LIMITED.
CONSOLIDATED REFINERIES LIMITED.
D'ARCY EXPLORATION COMPANY, LIMITED.
D'ARCY KUWAIT COMPANY LIMITED.
FORTH CHEMICALS LIMITED.
IRANO PRODUCTS LIMITED.
IRAQ PETROLEUM COMPANY, LIMITED.
KENT OIL REFINERY LIMITED.
KERMANSHAH PETROLEUM COMPANY LIMITED.
KHANAQIN OIL COMPANY, LIMITED.
KUWAIT OIL COMPANY LIMITED.
LUBRICANTS PRODUCERS LIMITED.
MARITIME REFINERIES LIMITED.
MOSUL PETROLEUM COMPANY LIMITED.
NATIONAL OIL REFINERIES, LIMITED.
SCOTTISH OILS, LIMITED.
SCOTTISH OILS AND SHELL-MEX LIMITED.
SHELL-MEX AND B.P., LIMITED.
THE ASSOCIATED ETHYL COMPANY, LIMITED.
THE CONSOLIDATED PETROLEUM COMPANY LIMITED.
THE FIRST EXPLOITATION COMPANY, LIMITED.
THE LOWLAND TANKER COMPANY, LIMITED.
THE TANKER INSURANCE COMPANY, LIMITED.
TRINIDAD NORTHERN AREAS LIMITED.

Sales in India and Pakistan are made through:

BURMAH-SHELL OIL STORAGE & DISTRIBUTING CO. OF INDIA LIMITED.
BURMAH-SHELL OIL STORAGE & DISTRIBUTING CO. OF PAKISTAN LIMITED.

Incorporated in British Commonwealth

AUSTRALIA—AUSTRALASIAN PETROLEUM COMPANY PROPRIETARY LIMITED.
THE COMMONWEALTH OIL REFINERIES, LIMITED.
ISLAND EXPLORATION CO. PTY. LIMITED.

MALTA—BP MALTA, LIMITED.

NEW ZEALAND—THE BRITISH PETROLEUM COMPANY OF NEW ZEALAND, LIMITED.
THE BRITISH PETROLEUM COMPANY OF NEW ZEALAND (SOUTH WEST PACIFIC), LIMITED.

NIGERIA—THE SHELL-D'ARCY PETROLEUM DEVELOPMENT CO., OF NIGERIA, LIMITED.

Incorporated in Foreign Countries

ALGERIA—SOCIÉTÉ DES HUILES DE PÉTROLE BP D'ALGÉRIE S.A.

AUSTRIA—BP BENZIN UND PETROLEUM A.G.

BELGIUM—BP BELGIUM S.A.
ANGLO-BELGE DES PÉTROLES S.A.
SOCIÉTÉ INDUSTRIELLE BELGE DES PÉTROLES, S.A.

DENMARK—BP OLIE-KOMPAGNIET A/S

EGYPT—ANGLO-EGYPTIAN OILFIELDS, LIMITED.

FRANCE—SOCIÉTÉ GÉNÉRALE DES HUILES DE PÉTROLE BP S.A.

FRENCH WEST AFRICA—SOCIÉTÉ DES PÉTROLES BP D'AFRIQUE OCCIDENTALE.

GERMANY—BP BENZIN- UND PETROLEUM-G.m.b.H.

HOLLAND—BENZINE EN PETROLEUM HANDEL-MAATSCHAPPIJ, N.V.

ICELAND—BP A ISLANDI HLUTAFELAG.

ITALY—BRITANNICA PETROLI S.p.A.
INDUSTRIA RAFFINAZIONE OLII MINERALI.

MOROCCO—SOCIÉTÉ DES HUILES DE PÉTROLE BP DU MAROC S.A.

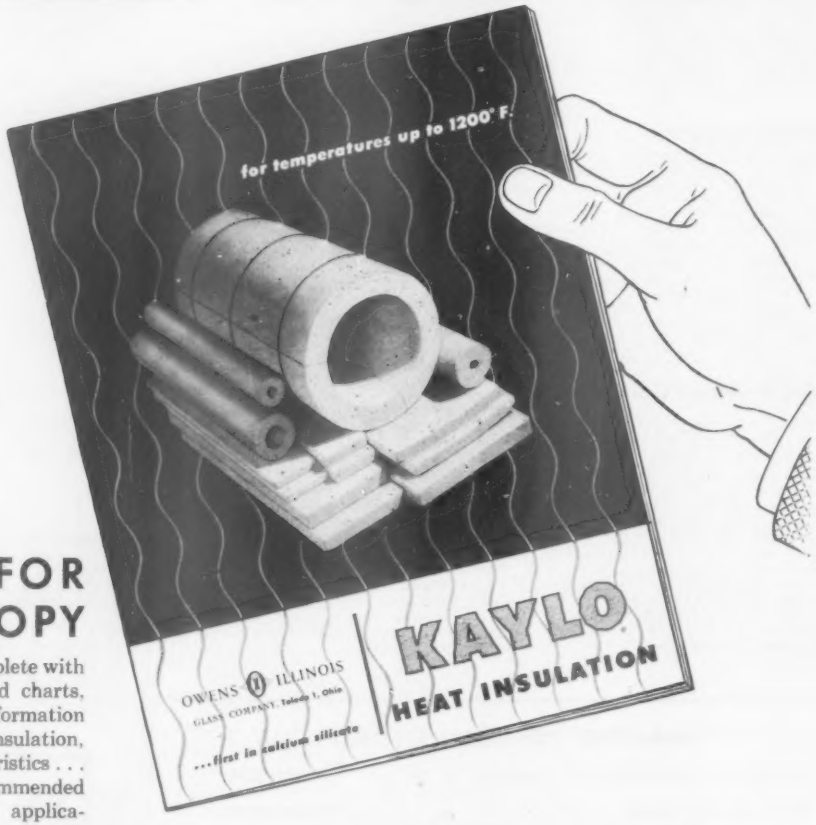
NORWAY—NORSK BRAENDSELOLJE A/S.

SWEDEN—SVENSKA BP OLJEAKTIEBOLAG.

SWITZERLAND—BP BENZIN UND PETROLEUM A.G.

TUNISIA—SOCIÉTÉ DES HUILES DE PÉTROLE BP DE TUNISIE S.A.

Every User Can Profit of Heat Insulation From This New Book



WRITE FOR YOUR COPY

This useful book, replete with pictures, graphs and charts, contains specific information on Kaylo Heat Insulation, including characteristics . . . efficiencies . . . recommended thicknesses . . . and application data for pipes, vessels and flat surfaces. For your free copy of this book, write: Dept. N-233, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

Kaylo Heat Insulation is a hydrous calcium silicate—the heat-saving material that is revolutionizing insulation practice with its outstanding combination of advantages.

KAYLO® . . . *first in calcium silicate*

. . . pioneered by OWENS ILLINOIS **Glass Company**

MAIN OFFICE: TOLEDO 1, OHIO — KAYLO SALES OFFICES: ATLANTA • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DETROIT HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON

Down time got you down?

You Need Improved Baldwin Assembly Riveted Roller Chain!

There's no doubt about it . . . with Improved Baldwin Assembly Roller Chain you can drastically reduce down time . . . drill more feet of hole per day . . . make more profit per job.

Here's why . . .

The Improved Baldwin Assembly features the *Single Pin Coupler Link* . . . it's easy to take apart . . . easy to install . . . easy to repair . . . and easy to spot because of its straight edged side plates.

One end of the single pin coupler link is firmly riveted to the adjacent link (1). The other end contains the unique Coupler Pin (2). One end of this pin is spun over a washer (3). The other end has a milled flat and locking pin (4). The Coupler Pin is an easy fit through the chain except for the milled flat end which is press fitted through the special matching hole (5) in the coupler link plate. Thus, you have to drive the pin only the length of its milled flat in assembling or disassembling the chain.

THIS CHAIN LASTS FAR LONGER . . . . it's a riveted chain, with all the riveted advantages. No "sloppy" pin fits to cause quick wear . . . premature failure.

IT'S "MADE UP" . . . NOT "CUT UP"

You can *make up* Baldwin Assembly to any length chain you need. It comes boxed in 10-foot lengths with the exclusive single pin couplers installed at convenient intervals. Each box contains a chart which shows you quickly and easily which sections to use to get the exact length or number of pitches you need.

For all the facts, see your local supply store or mail the coupon for your copy of our new Oil Field Chain Bulletin 52-3. Baldwin-Rex Oil Field Sales Offices located in New York • Tulsa • Dallas Houston • Midland • Los Angeles

BALDWIN-REX ROLLER CHAINS

A PRODUCT OF **Chain Belt** COMPANY OF MILWAUKEE

Chain Belt Company 52-425
4619 W. Greenfield Ave.
Milwaukee 1, Wis.
Please send me Bulletin 52-3.

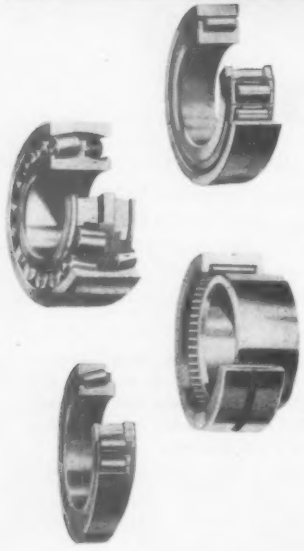
Name .....

Company .....

Address .....

City ..... State .....

over-all service...



The responsibility of the Torrington engineer does not end with a recommendation for a particular type of anti-friction bearing. He makes every effort to "follow through" to see that the bearing continues to give the best possible performance, with a minimum of maintenance.

Over-all service—starting with the original design and continuing through in-service operation—has helped to produce the *lasting* solution to the friction problems of many manufacturers. Why not discuss *your* application with a Torrington engineer today?

THE TORRINGTON COMPANY
South Bend 21, Ind. Torrington, Conn.
District Offices and Distributors in Principal Cities of the United States and Canada

TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers

Easy to Order! . . .

. . . Quick and Easy to Install!

Grinnell Welding Fittings

Any qualified welder can make welds quickly and easily with Grinnell welding fittings. These fittings are made by a hydraulic forging process that assures uniform wall thickness at all points and true circularity throughout. Of seamless, one-piece construction, they can be cut at any angle to match up with standard weight, extra strong and heavier wall pipe in I.D. or O.D. sizes. Pressure-temperature ratings are equal to or greater than those of seamless steel pipe. Grinnell welding fittings are process stress-relieved.

Full data on the complete line of Grinnell seamless carbon steel welding fittings and forged steel flanges is contained in the Grinnell Welding Fittings catalog. Send for a copy.

GRINNELL
WHENEVER PIPING IS INVOLVED

RANGE OF TYPES AND SIZES

Description	Standard Weight	Extra Strong	Schedule 160	Double Extra Strong	Light Gauge Nominal Pipe Size	Light Gauge Iron Pipe Size
ELBOWS 90° Long Radius	½"-30"	½"-30"	1"-12"	¾"-8"	4"-24"	¾"-12"
90° Long Tangent	1½"-12"	1½"-12"	.....	.....	.....	.....
90° Reducing	2"x¾" to 6"x5"		.....	.....	.....	.....
90° Short Radius	1"-30"	1½"-30"	.....	.....	.....	.....
45° Long Radius	½"-30"	¾"-30"	1"-12"	¾"-8"	4"-24"	¾"-12"
RETURNS 180° Long Radius	½"-30"	½"-30"	1"-12"	2"-8"	4"-24"	¾"-12"
180° Short Radius	1"-30"	1½"-30"	.....	.....	.....	.....
180° Ex. Long Radius	1"-2½"	1"-2½"	.....	.....	.....	.....
TEES — Straight	½"-24"	½"-24"	½"-12"	½"-8"	.....	.....
Reducing Outlet	½"-24"	½"-24"	¾"-12"	¾"-8"	.....	.....
REDUCERS Concentric & Eccentric	¾"-24"	¾"-24"	¾"-12"	¾"-8"	.....	.....
CAPS	¾"-24"	¾"-24"	1"-12"	1"-8"	.....	.....
STUB ENDS — Lap Joint	½"-24"	½"-24"				
SADDLES	2"-24"					
LATERALS — Straight	1¼"-24"	1¼"-24"				
Reducing	1¼"-24"	1¼"-24"				
CROSSES — Straight	1¼"-24"	1¼"-24"				
Reducing	1¼"-24"	1¼"-24"				
BACKING RINGS	2"-24"	2"-24"				

Also available in certain sizes are: 90° long and short radius elbows, 45° long radius elbows and 180° long and short radius returns in Schedules 30, 40, 60 and 80.

Grinnell welding fittings and flanges conform to applicable ASA and ASTM Standards.

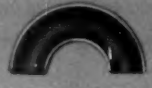
GRINNELL WELDING FITTINGS ARE QUALITY-CONTROLLED FOR DEPENDABILITY

TRUE CIRCULAR SECTION

True circular section at all points makes a Grinnell fitting easy to align and weld . . . there is no distortion or no flattening to affect flow adversely.

FULL EFFECTIVE RADIUS

The loss of pressure through Grinnell welding elbows is held down to an absolute minimum . . . because of the full and the effective sweep of the radius.



SMOOTH, CLEAN INSIDE SURFACE

Grinnell fittings have uniformly smooth inner walls . . . no waves or ridges to cause turbulence or accelerate erosion or corrosion. No pockets to trap solids.

EASY, SWEEPING TURNS

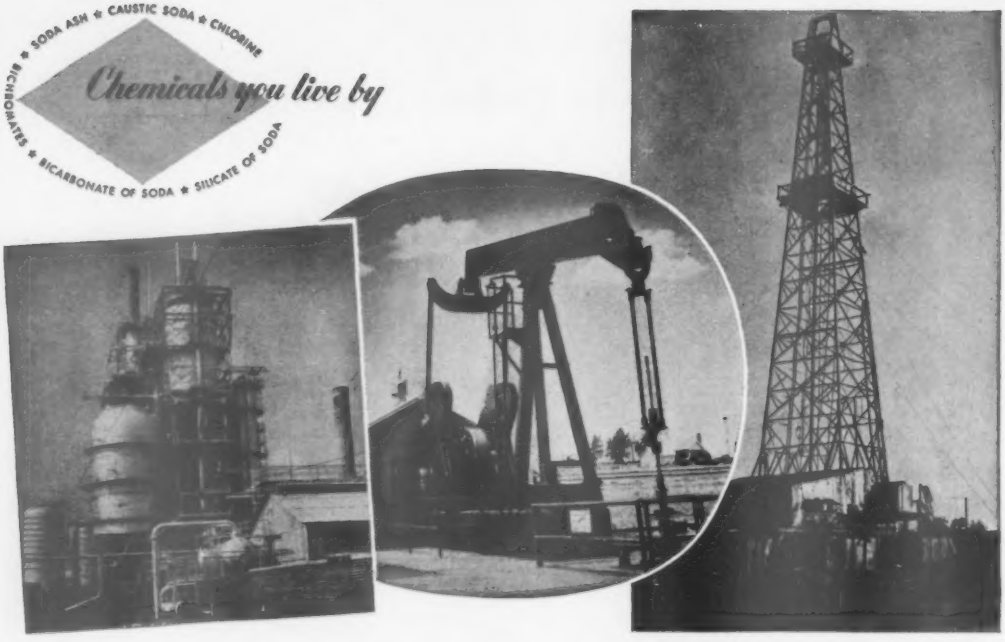
In Grinnell welding tees, corners where outlet joins the run are well-rounded and perfectly smooth to minimize resistance to flow and to prevent trapping.

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

Chemicals you live by

SODA ASH ★ CAUSTIC SODA ★ CHLORINE ★ BICHROMATES ★ BICARBONATE OF SODA ★ SILICATE OF SODA



One tax on this piping YOU CAN DUCK...

Corrosion takes a continual toll on your profit, just like your taxes. But unlike taxes, you can do something about it. Research by DIAMOND ALKALI is proving the effectiveness of chromate chemicals as corrosion inhibitors—in drilling equipment, in producing wells, in refineries.

For example, in producing wells chromate chemicals are helping to reduce the corrosive effect of the effluent to a minimum. Added to drilling fluids, they are lengthening the life of drill strings. In cooling systems of Diesel engines, in pumping systems, in fact, almost everywhere that water circulates, chromates are checking corrosion.

It will pay you to investigate the progress made in the application of these chemicals. There's a DIAMOND salesman near you. Why not call him today?

DIAMOND SALES OFFICES: Boston, New York Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also representatives in other principal cities.

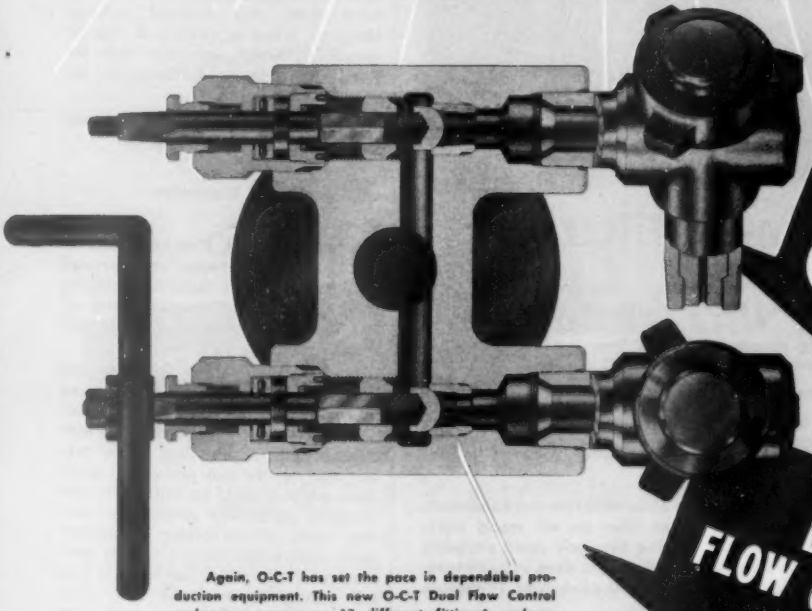
DIAMOND CHEMICALS FOR THE OIL INDUSTRY

DIAMOND ALKALI COMPANY • CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

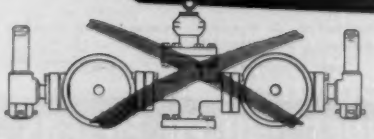
NOTHING ELSE LIKE IT

under the sun



The New O-C-T

DUAL FLOW CONTROL



Again, O-C-T has set the pace in dependable production equipment. This new O-C-T Dual Flow Control replaces as many as 13 different fittings*, reduces weight as much as 85%, effects savings up to $700.00 when used to replace a 10,000 lb. test conventional double wing, provides a more flexible choice of chokes than any other dual assembly, the proven JE Flow Control floating gate design makes it operate easily even at extremely high pressures and the operator may switch the flow from one size choke to another without closing in the well.

Ask your O-C-T Representative or write for details. The New O-C-T Dual Flow Control is now available through more than 700 supply stores.

Oil Center Tool Co.

P. O. Box 3091 Houston, Texas

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.

IT REPLACES 13 DIFFERENT FITTINGS

- . . . Reduces cost as much as 300%
- . . . Reduces weight as much as 85%
- . . . Uses any type positive choke bean
- . . . Provides easy operation even at extremely high pressures

OLIVER

Precoat Filter

Versatile Clean-Up Filter

This Oliver Precoat is taking care of three distinctly different filtration jobs in the Rock Island Refinery Corporation's plant at Indianapolis, Indiana.

a . . . dewatering flocculation sludge from waste water treating plant

b . . . dewatering separator box bottoms

c . . . breaking oil emulsions

This Oliver Precoat is More than a 'Jack of All Trades' Filter; it's the 'Master of All.'

The Oliver Precoat Filter is versatile because it's adaptable to many conditions. Several refineries now have this type of Oliver Filter for all 'round work, recovering wastes and breaking emulsions. It's the filter you could probably use to advantage in your refinery. It's available in several sizes in open type, as at Rock Island, hooded or vapor tight for handling noxious or flammable materials; or totally enclosed, for pressure operation.

To all filtration and clarification problems, Oliver United brings forty-five years of experience. Our engineers have served industry all over the world and have developed many types of filters for all three principles of filtration: continuous vacuum, continuous pressure and batch pressure.

New York 36 — 33 W. 42nd St. Chicago 1 — 221 N. LaSalle St.
Oakland 1 — 2900 Glascock St. San Francisco 11 — 260 Calif. St.
Export Sales Office — New York • Cable — OLIUNIFILT

FACTORIES:
Hazleton, Pa.
Oakland, Calif.

OLIVER UNITED FILTERS INC.

WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES

CANADA
E. Long, Ltd.
Orillia, Ontario
MEXICO & CENT. AMERICA
Oliver United Filters Inc.
Oakland, Calif.
INDIA
Dorr-Oliver (India) Ltd., Bombay
EUROPE & NORTH AFRICA
Dorr-Oliver S.A. Brussels
Dorr-Oliver S.N.a.R.L. Paris
Dorr g.m.b.h. Wiesbaden (16)
Dorr-Oliver Co., Ltd., London, S.W. 1
Dorr-Oliver S.a.R.L. Milano
Dorr-Oliver, N.V. Amsterdam-C
PHILIPPINE ISLANDS
E. J. Nell Co.
Manila
HAWAIIAN ISLANDS
A. R. Duvall
Honolulu
WEST INDIES
Wm. A. Powe — Havana
SOUTH AMERICA & ASIA
The Dorr Co.
Stamford, Conn.
AUSTRALIA
Hobart Duff Pty., Ltd.
Melbourne
SOUTH AFRICA
E. L. Bateman Pty., Ltd.
Johannesburg, Transvaal

They Say—

Eisenhower on Tidelands

"To the extent constitutional, I favor legislation by the Congress to vest control in the states to 3-mile or 3-league limit as appropriate. I believe in decentralizing government and in bringing its responsibilities, control and services as close to the people as possible.

"Of course, we must recognize the right and responsibility of the federal Government over national security. However, I see no conflict in this responsibility which interferes with the vesting of title of tidelands in the states."

Gen. Dwight Eisenhower in a telegram to H. J. Porter, Houston.

On Compulsory Unitization

Sir:

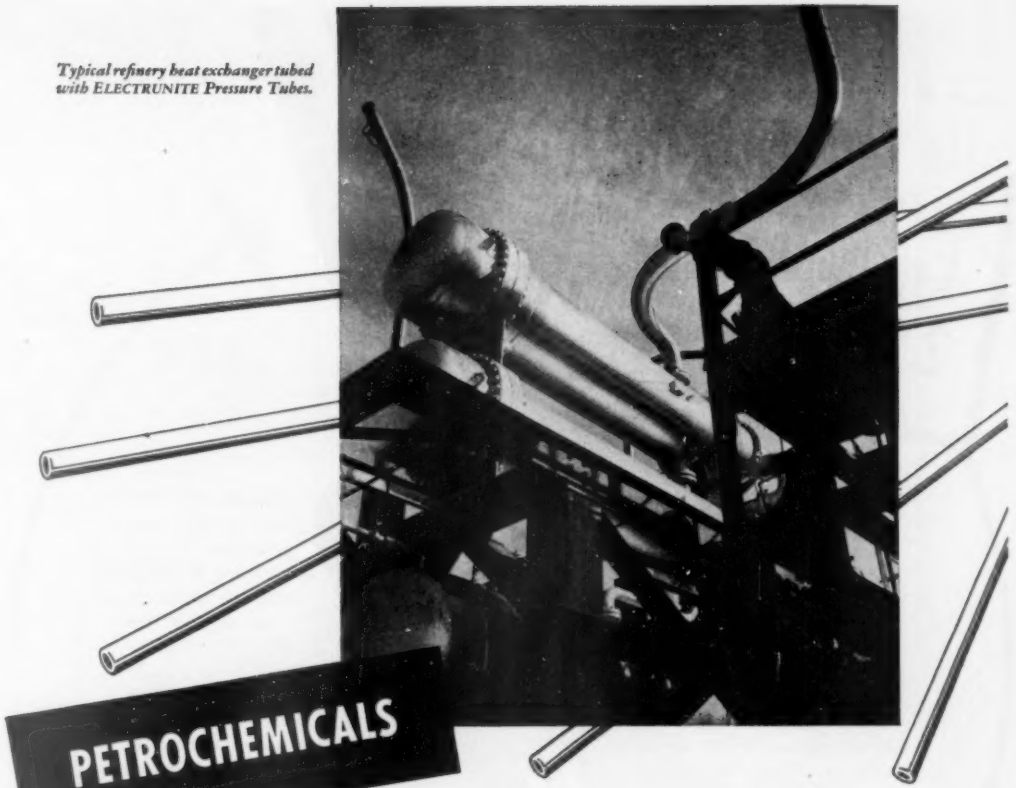
In my judgment, it is impossible to unitize properties owned and operated by different parties without sacrificing some of the ability, incentive, and effort that would be applied to individually-operated properties.

If several properties are combined with the same kind of development and producing practice, you cannot compare one method of operation with another. One man's ideas would prevail and no one can prove that some other method would be better. No one would be particularly interested in cutting costs or increasing production since each would have a certain percentage of the return anyway. If you are getting better results than your neighbor, he is likely to adopt your methods and possibly improve on them.

One of the principal disadvantages of the unitization theory compulsively enforced by government is that it will not work, in my estimation, except in the minds of those who advocate it. I understand it has been given a rather thorough trial by Russia.

We simply cannot get away from personal incentive and the possible reward for greater effort and efficiency. Unitization makes a perfect set-up for government control and operation, and I think it is a long step in the direction of the communistic or socialistic pattern of life, toward which I fear we have unwittingly (and wittingly on the part of some people) gone farther than most realize. I recognize the need and possibilities of improving present secondary-recovery methods, but I believe

Typical refinery heat exchanger tubed with ELECTRUNITE *Pressure Tubes.*



PETROCHEMICALS

...another industry that stays on-stream with REPUBLIC ELECTRUNITE PRESSURE TUBES

Run through a list of the scores of different petrochemicals . . . count off the leading producers . . . you'll have lists that include hundreds of large installations and important users of Republic ELECTRUNITE Heat Exchanger, Condenser and Boiler Tubes.

The ELECTRUNITE process assures users that Republic's Pressure Tubes are top-quality inside and out . . . that tubes are uniform in wall thickness, roundness, and ductility. They are uniformly corrosion-resistant throughout the metal and full normalizing assures easier rolling-in properties in every length.

Let us tell you more about these pressure tubes that bend right, roll-in tight, stand up better wherever carbon or stainless steel tubes are specified.

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
224 EAST 131st STREET • CLEVELAND 8, OHIO

50th ANNIVERSARY 1902 1952 STEEL and TUBES DIVISION
ELECTRUNITE TUBING

REPUBLIC STEEL

Republic
ELECTRUNITE
BOILER, CONDENSER AND HEAT EXCHANGER TUBES

the fastest way to recover stuck pipe

1. THE DIA-LOG FREE POINT INDICATOR
2. THE STRING SHOT BACK-OFF

1 The Dia-Log Free Point Indicator indicates electronically the deepest point to which *both* torque and stretch can be applied in a string of stuck oil well pipe. Both torque and stretch readings are essential since left-hand torque is always used in subsequent back-off recovery operations.

2 After the exact location of the stuck point has been established, the same electric conductor cable, used for the Free Point Indicator, is employed to run a string shot back-off to the desired depth. Upon detonation, the string shot delivers a sharp jar to initiate the unscrewing of the desired joint.

PROVEN! — BY THOUSANDS OF SUCCESSFUL RUNS

The highly successful use of the Dia-Log Free Point Indicator and the String Shot Back-Off as a combination service has been proved in thousands of runs throughout the Gulf Coast, Mid-Continent, Rocky Mountain and California areas. Wire, write, telephone any Dia-Log Company or Ford Alexander Corporation office for fast, economical recovery of stuck drill pipe, drill collars or tubing.

OIL WELL ELECTRIC LINE SERVICES

THE DIA-LOG COMPANY

P. O. Box 14103 — Houston, Texas

Kilgore, Texas · Great Bend, Kan. · El Dorado, Ark. · Oklahoma City, Okla. · Odessa, Texas · Snyder, Texas · Lubbock, Texas · Farmington, N. M. · New Iberia, La. · Houma, La. · Corpus Christi, Texas · Natchez, Miss.

In California and Rocky Mountains

THE FORD ALEXANDER CORPORATION

P. O. Box 800 — Whittier, California

Ventura, Calif. • Taft, Calif.

this can be accomplished by individual operation of property.

I am against any formula which prescribes removal of the management of a property from the owners. I believe that regardless of the difficulty involved, the best procedure would be to rely upon agreement between lease owner and land owner without government compulsion on either side.

W. S. Hallanan, president
Plymouth Oil Co.
Pittsburgh.

Contents Shift

Sir:

May I take this opportunity to congratulate you on the change of your Table of Contents to page 1. It was a long needed step . . .

Milton R. Beychok, chief chemist
Rothschild Oil Co.
Santa Fe Springs,
California.

Too Much Speculation?

"I cannot help but wonder if there is not too much speculation in oil and gas leasing on the public lands and not enough actual development. . . .

"There is nothing wrong or undesirable about speculation. What I am concerned with is the type of speculation which is more anxious to exploit other people than it is to try to develop resources.

"Increased leasing activity of 40 to 60 per cent has been noticed in the land offices as a result of advertisements in various papers of several agencies offering to obtain for individuals 40-acre oil and gas leases from the Government.

"Although the Government asks only $30 as filing fee and advance rentals for such leases, the agencies charge from $70 to $300."

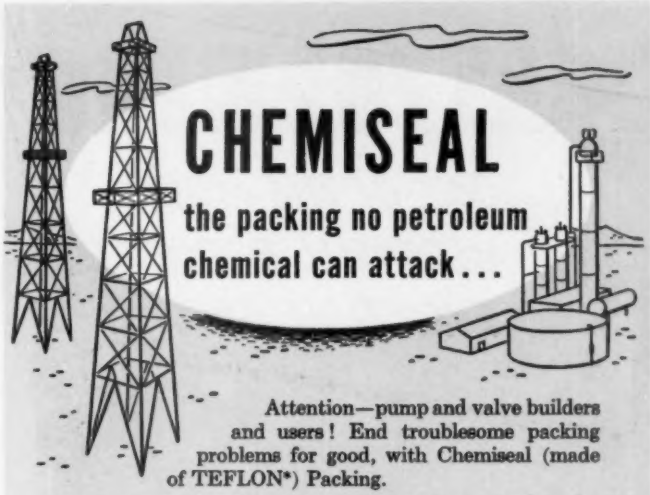
Marion Clawson, director of the Bureau of Land Management, speaking in Great Falls, Mont.

New Tidelands Explanation

". . . The reason I issued the proclamation laying claim to the mineral contents of the Continental Shelf was because I did not want any foreign power taking possession of those assets . . ."

President Truman in a letter to Amon Carter as published in the Fort Worth Star-Telegram.

". . . That seems to say that the federal Government can defend only that which it owns outright—a curious theory if there ever was one. If Galveston were threatened by foreign attack, it scarcely could be argued that



CHEMISEAL
the packing no petroleum chemical can attack . . .

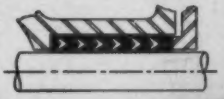
Attention—pump and valve builders and users! End troublesome packing problems for good, with Chemiseal (made of TEFLON*) Packing.

Chemically inert, there is no need to change packing for different crudes or operating conditions.

Chemiseal is also highly resistant to abrasion, is serviceable from —110°F. to 500°F., stands up where other packings fail rapidly.

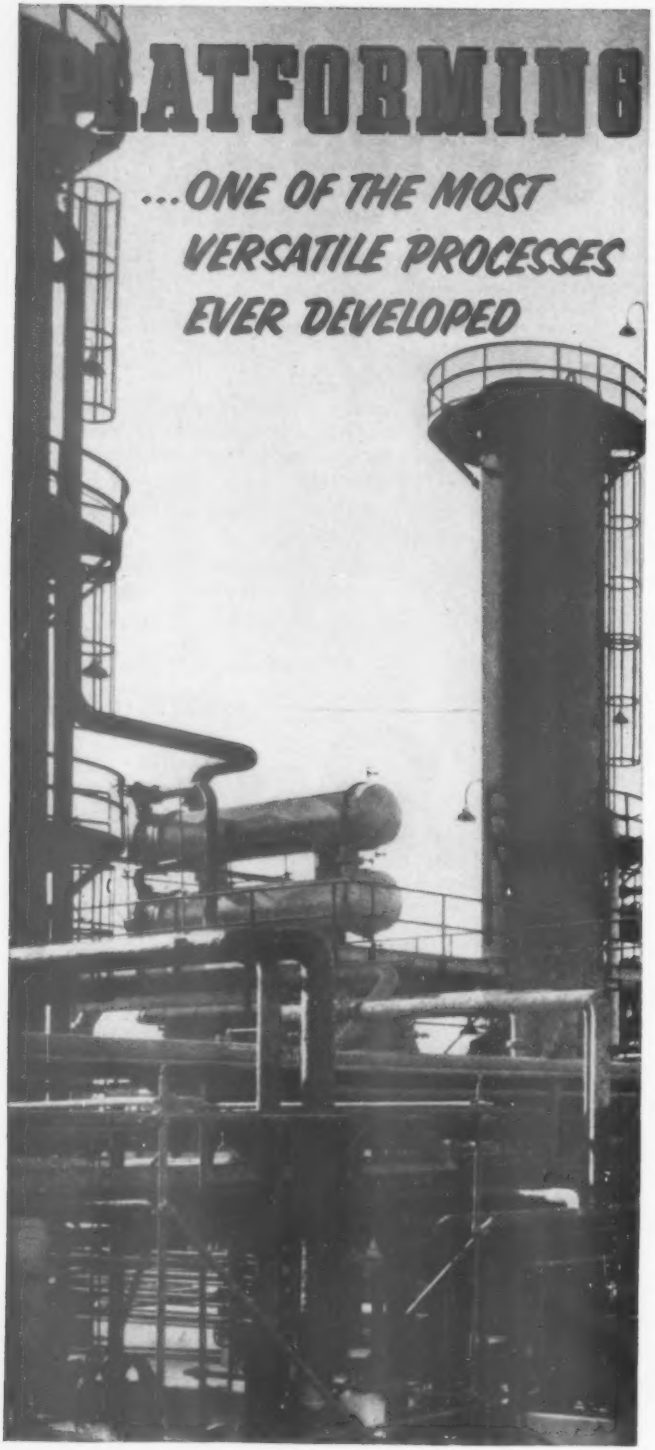
Chemiseal Valve Packing No. 810-V provides necessary seal at low gland pressure, reducing torque required to operate valve. Supplied in quantity or in sets with square-end Teflon adaptors. Write for catalogs Nos. 711 and 810-V.

Chemiseal Pump Packing No. 711, for rotating or reciprocating shafts, provides a low-friction, 2-way seal that not only prevents axial seepage, but seals against shaft and stuffing box as well. Sets supplied for specific requirements.



UNITED STATES GASKET COMPANY
FLUOROCARBON PRODUCTS DIVISION
FABRICATORS OF "TEFLON", KEL-F AND OTHER FLUOROCARBON PLASTICS
CAMDEN 1, NEW JERSEY

*duPont's trademark for its tetrafluoroethylene resin



Eastern States Places Platforming and Udex Units In Operation

By R. B. Kahle

President,
Eastern States Petroleum
Company, Inc.

THE WORLD'S first commercial Udex unit was placed on stream at our Houston refinery April 2, 1952. It marked a major development in Eastern States' policy of building for the future.

R. B. Kahle

We have also recently installed a UOP Platforming unit which is presently providing the feed for the Udex unit Both of these units were inspected at open house ceremonies at the refinery on the Houston Ship Channel on February 28

The installation of these two new units puts Eastern States into the fast-growing petro-chemical industry where we feel we will be able to make substantial contributions to the rapidly growing demands for petro-chemical products.

4500 b/d Design Capacity

The new Platforming unit, which has a nominal design capacity of 4,500 barrels daily, is being used for the production of aviation gasoline base stocks It charges a 330 degree depentanized straight run gasoline for avgas base production or a like amount of 400 degree straight run naphtha if the unit is to be operated for the production of high octane motor fuel

In the operation of the Platforming unit, the full boiling range straight run gasoline charge is supplied to a prefractionation tower This column is used to prepare the Platformer charge, taking the light fraction overhead, which consists essentially of pentanes and lighter, and removing a bottoms cut, thus leaving a naphtha fraction of controlled boiling range for reactor charge.

The reactor charge, taken as a sidecut from this column, is pumped by means of a centrifugal pump and this stream is joined with the recycle hydrogen gas before going into a heat exchanger.

Total feed is then passed through a heater to the No. 1 reactor where the reactions which take place result in a decline in reactant temperature.

The effluent from the No. 1 reactor is reheated in an interheater and is passed on to the No. 2 reactor where additional reaction takes place. The effluent from the No. 2 reactor is again heated and passed to the No. 3 reactor. The total effluent from this reactor after re-heating is sent to the No. 4 reactor.

Gas is then separated from the liquid in a product separator, with the bulk of the gas going to recycle gas compressors for return to the reactor section. Liquid from the product separator is charged to the stabilizer.

This stabilizing column is operated primarily as a depentanizer, C_5 and lighter being taken overhead, with full benzene retention in the bottoms Bottoms are then fed to a dehexanizer column, where Udex feed is separated as an overhead fraction This cut contains between 12 and 20 per cent ,benzene, depending on the quality of the charge stock and the operating conditions in the reactor section.

The Udex Unit

Eastern States' Udex unit is designed to charge about 1,000 barrels per stream day.

The feed to the Udex unit enters an extractor which employs an unusual tray design, especially developed for this process. In this column, the glycol solvent flows countercurrently to the feed. The solubility and selectivity of the glycol are controlled by water which is mixed in specific proportions with the glycol, resulting in excellent selectivity—a matter of prime importance in the Udex process.

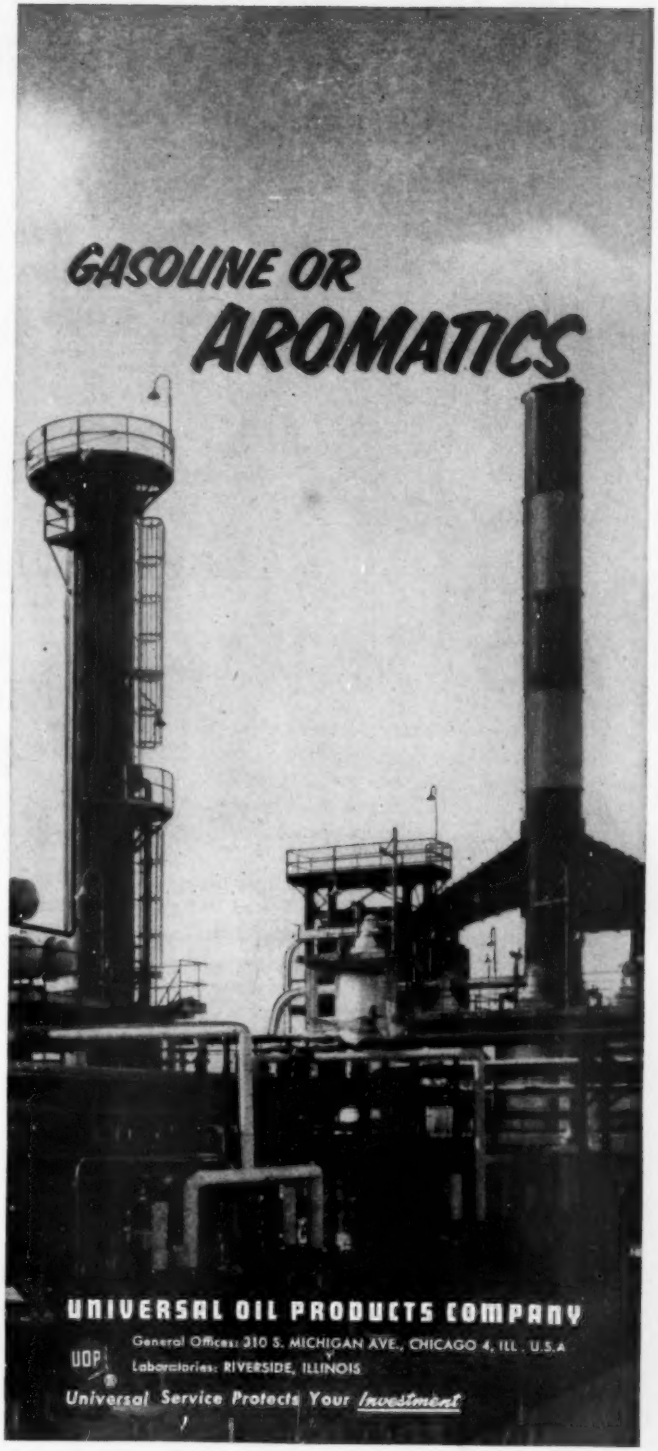
The rich extract from the extractor is fed into a solvent recovery column in which the benzene is separated from the lean solvent which is returned to the extractor The hydrocarbons from the stripper pass through a condenser to a receiver in which a two-phase system is established. The water phase, which also contains any glycol which has vaporized, is returned to the stripper.

Industrial Grade Benzene

The hydrocarbon phase is in part returned to the extractor as reflux, and the remainder provides feed to a fractionating tower from which industrial grade benzene is obtained as a product.

Eastern States believes that the installation of these two new units is another of the major steps forward which the company has taken in its 20 years of operation. Together with the new Rancho pipeline facilities which will be completed in the near future, these units place Eastern States in an enviable position — completely prepared to meet the demands of its customers in the petroleum and petro-chemical fields.

(Advertisement)



an ACCO product

HELICOID

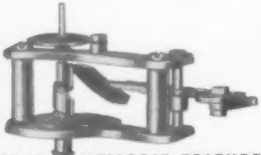
The gage that retains its original accuracy longer, lasts longer, costs less per gage, per year

NOW...a 3½" Gage

Now you can get the popular gearless Helicoid Movement in a 3½" Helicoid Gage for pressures from 100 lbs. to 10,000 lbs. and vacuum, in steel systems, or 15 lbs. to 1000 lbs. and vacuum, in bronze systems. Phenol or ACALOY case. Prominent black letters on white phenol dial. Stem, panel or flush mounting.

The Helicoid Movement is a simple cam and roller design that has no teeth to wear out. Tested and proved in years of hard service. Helicoid Gages give long, trouble-free service with little maintenance.

Only Helicoid Gages have the gearless Helicoid Movement, so look for the name Helicoid.



Write today
for the Helicoid Catalog

FOUR HELICOID FEATURES

1. Stainless Steel Helicoid Roller (no gear teeth)
2. Stainless Steel Hair Spring
3. Long Life Cam (no gear teeth)
4. Corrosion Resistant Link and Screws

ACCO

HELICOID GAGE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

929 Connecticut Avenue • Bridgeport 2, Connecticut

HELICOID Pressure • Vacuum GAGES

the federal Government had no right or obligation to defend it merely because the title to the city was not in the name of the United States . . ."

Amon Carter in a letter to President Truman, as published in the Fort Worth Star-Telegram.

CALENDAR

JULY

21-25 National Conference on Clays and Clay Technology, University of California, Berkeley.

AUG.

1- 3 Wyomtng Geological Association, field trip, Big Horn basin.

11-13 Society of Automotive Engineers, national West Coast meeting, Fairmont Hotel, San Francisco.

18 Illinois Oil & Gas Association and Illinois Basin chapter of American Petroleum Institute, annual mid-summer Oil Men's Outing, Meadow Woods Country Club, Centralia, Ill.

19-22 American Institute of Electrical Engineers, Pacific general meeting, Westward Ho Hotel, Phoenix, Ariz.

25-27 Twelfth Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPT.

1- 3 Interstate Oil Compact Commission, fall meeting, Banff, Canada.

1- 5 International Symposium on Combustion, Massachusetts Institute of Technology, Boston.

3- 5 Pacific Coast Gas Association, Ambassador Hotel, Los Angeles.

4- 5 Rocky Mountain Oil & Gas Association, refining committee, Newhouse Hotel, Salt Lake City.

8-12 Instrument Society of America, seventh national instrument conference and exhibit, Cleveland.

10-12 National Petroleum Association, fiftieth annual meeting, Hotel Traymore, Atlantic City, N. J.

11-13 American Institute of Chemical Engineers, regional meeting, Palmer House, Chicago.

12-13 Association of Desk and Derrick Clubs of North America, first annual meeting, Shamrock Hotel, Houston.

13 Seventh National Chemical Exposition, Chicago Coliseum.

24-25 Independent Petroleum Association of America, annual meeting, Skirvin Hotel, Oklahoma City.

25-26 Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo.

29-30 American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

OCT.

1- 3 American Institue of Mining and Metallurgical Engineers, Mid-Continent fall meeting, Rice Hotel, Houston.

1- 3 National Association of Corrosion Engineers, South Central Region, technical program and committee meetings, Jung Hotel, New Orleans.

1- 3 American Institute of Mining and Metallurgical Engineers, Mid-Continent fall meeting, petroleum branch, Rice Hotel, Houston.

2- 3 Petroleum Electric Power Association, twenty-third annual meeting, Mayo Hotel, Tulsa.

Here's another important reason why

REED TOOL JOINTS *last longer*

All **REED** Tool Joints have dark threads for a very good reason—to prevent galling! The threads are given a treatment that changes the surface of the steel into a complex metal phosphate.

This complex metal phosphate acts like a lubricant that *won't squeeze out!* It effectively prevents galling during the breaking-in period.

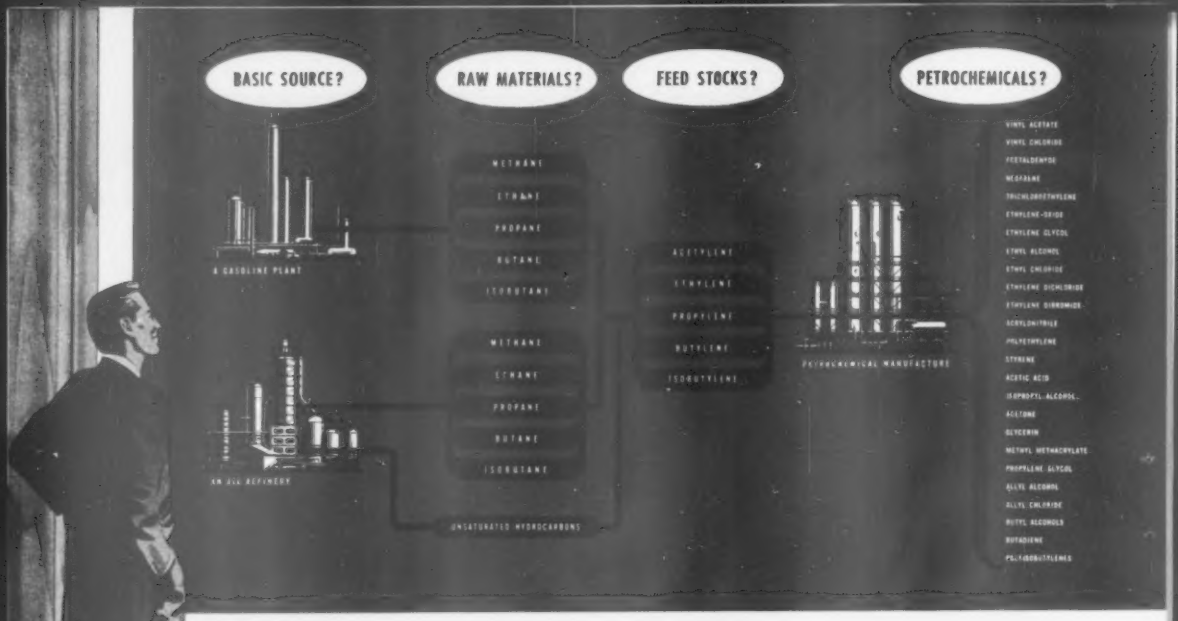
This is another of many important reasons why **REED** TOOL JOINTS LAST LONGER!

REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

NEW YORK LONDON BUENOS AIRES

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products



Where do you fit in this petrochemical picture?

Currently engaged in this highly specialized work, Fluor can help determine your potentials in this rapidly expanding industry.

Petrochemicals, the largest new factor in our ever-expanding world of chemicals, now account for nearly one-quarter of all U. S. chemical production. Despite this, it is estimated that only one-half of one percent of all present oil and gas production is being utilized as petrochemical feed stock. This opens up new opportunities for the oil and gas producer and investor.

If you own, operate, or have interests in an oil refinery or a gasoline plant, you should be aware of *your* potential as a supplier of petrochemical raw materials. This is particularly so when it is considered that the increase in value of an end petrochemical product may easily be four or five times greater than that of normal products realized from other hydrocarbon processing operations!

Let Fluor assist you...

The proven abilities to design, engineer and construct complete plants and facilities for the petroleum, natural gas and petrochemical industries have established The Fluor Corporation as one of the nation's major engineering and construction organizations.

One call to Fluor will place men with broad and diversified experience in petroleum and chemical engineering technology and economy at your disposal. Let Fluor put these talents and facilities to work for you. You will be sure with Fluor!

FLUOR

Engineers - Constructors - Manufacturers

THE FLUOR CORPORATION, LTD. · LOS ANGELES · HOUSTON
New York, Chicago, Pittsburgh, Boston, Tulsa, San Francisco, Birmingham and Calgary

Represented in the Sterling areas by:
Head Wrightson Processes Ltd., Teesdale House, Baltic Street, London, E.C.1, England

SINCE 1909

3- 5 New Mexico Geological Society, annual field conference, Santa Fe.

4 John Zink Process Heating seminar, John Zink Co. plant, Tulsa.

6 Independent Natural Gas Association of America, annual meeting, Fontenelle Hotel, Omaha, Neb.

9-10 California Natural Gasoline Association, twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles.

13-15 Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth.

13-17 American Institute of Electrical Engineers, fall meeting, New Orleans.

16-19 Permian Basin Oil Show, Odessa, Tex.

19 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

20-21 Independent Petroleum Association of America, annual meeting, Mayo Hotel, Tulsa.

22-24 Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.

22-24 American Institute of Mining and Metallurgical Engineers, West Coast fall meeting, petroleum branch, Statler Hotel, Los Angeles.

23-24 American Institute of Mining and Metallurgical Engineers, West Coast fall meeting, Statler Hotel, Los Angeles.

24-25 Independent Petroleum Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City.

27-31 American Gas Association, annual convention, Atlantic City, N. J.

30-Nov. 1 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOV.

3- 4 Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, Mo.

5- 7 Industrial Management Society, 16th annual time and motion study and management clinic, Sheraton Hotel, Chicago.

6- 7 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

6- 8 Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Tex.

8-13 Oil Industry Information Committee, Conrad Hilton Hotel, Chicago.

10-13 American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

13-14 Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth.

20-22 Instrument Maintenance Short Course, jointly sponsored by Southern California Meter Association and Los Angeles Harbor Junior College.

30-Dec. 5 American Society of Mechanical Engineers, Statler Hotel, New York City.

DEC.

1- 6 Twentieth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.

5- 6 Interstate Oil Compact Commission, winter meeting, Wichita, Kans.

7 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.

7-10 American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland.

Behind the Scenes at **PLS . . .**

Where Ideas Come to Life for More Dependable Protection

Here is another of the unseen services that give you more for your money in pipe cleaning, priming, coating and wrapping at PLS. In this modern machine shop, specialists convert the ideas born in the engineering laboratory into original equipment to serve all six Pipe Line Service plants. These machine shop facilities make possible constant improvements in equipment and service that are reflected in the high quality protection provided for PLS customers.

21 Years of Dependable Service

PIPE LINE SERVICE PLS CORPORATION

Pioneers in Steel Pipe Protection

General Office and Plant: Franklin Park, Illinois

Plants at Glenwillard, Penna.; Longview, Texas; Corpus Christi, Texas; Harvey, Louisiana; and Sparrows Point, Maryland

HINDERLITER

YH CASING HEADS

the only CONTROL HEAD you need on a well

The YH is the most versatile casing head now available. It can be used on a well from the time the surface pipe is set until the well is no longer a profitable producer — it is used during drilling, while drilling-in, during completion, and on production by natural flow or artificial lift.

1 The YH Casing Head was the first to be provided with a removable drilling flange — that could be used as a base for Christmas Tree or blow-out preventer.

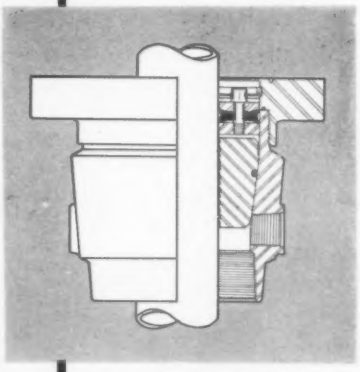
2 It is a compact unit with Unitized Packing that can be made up with a set screw wrench, eliminating the need for large cellars when bars or tongs are required for make-up.

3 The YH head has a unique method that provides an effective seal at the least application of pressure.

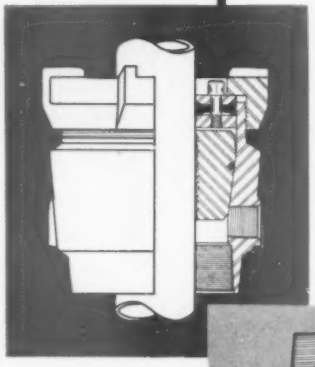
4 When equipped with the "Siamese Adapter," another Hinderliter first, hours of rig time are saved by eliminating the nippling-up process.

5 Slips, of advanced design, will handle the longest strings of N-80 casing.

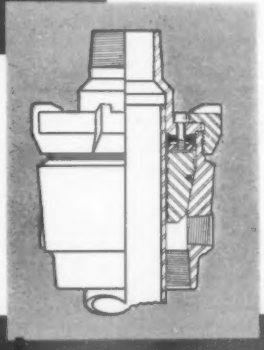
6 YH Head has 100% Full Opening bore.



HINDERLITER
Type YH Casing Head with Flanged Top.



HINDERLITER
Type YH Casing Head with Cap.



HINDERLITER
Type YH Casing Head with "Siamese Adapter"

See the versatile YH Head at your supply store for your next well.

HINDERLITER PORTER

HINDERLITER TOOL COMPANY DIVISION
H. K. PORTER COMPANY, INC.
DRAWER 2450 TULSA 1, OKLAHOMA

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

●

P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

EDITORIAL STAFF
C. O. Willson, **Editor;** Kenneth B. Barnes, **Managing Editor;** Henry D. Ralph, **News Editor;** George H. Weber, **Refining Editor,** 500 Fifth Avenue, New York; Dahl M. Duff, **International Editor,** 500 Fifth Avenue, New York; Gerald L. Farrar, **Engineering Editor;** Paul Reed, **Pipe-Line Editor;** W. L. Nelson, **Technical Editor.**

Associate Editors: Lynn M. Nichols, Neil Williams, R. B. Tuttle, Philip C. Ingalls, and John C. Casper.

District Editors: TULSA: Ted A. Armstrong, Joseph A. Kornfeld, John C. Reidel, William P. Sterne, Robert J. Enright, and John C. McCaslin. HOUSTON, Sterling Building: Walter Rose, and F. Lawrence Resen. LOS ANGELES, 650 South Grand Avenue: D. H. Stormont. DALLAS, Mercantile Bank Building: Carl F. Hoot. WASHINGTON, D. C., 621 Albee Building: Bertram F. Linz. MIDLAND, TEX., McClintic Building: Roy F. Carlson. CHATHAM, ONT., 35 Stanley: Victor Lauriston.

Editorial Assistants: Carolyn Carter, Tulsa; Martha Allbright, Tulsa, and Wilma Van London, Houston.

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., and Mount Pleasant, Mich.

Advertising Offices: TULSA: John D. Reilly, Mid-Continent Manager, 211 South Cheyenne; NEW YORK: Charles A. Wardley, Eastern Manager, and Robert N. Caird, Jr., Representative, 500 Fifth Avenue, Phone LOngacre 4-1750; CHICAGO: C. R. Farmer, Manager, and E. S. Klappenbach, Representative, 105 West Madison Street, Phone Central 6-2537; PITTSBURGH: Alfred M. Jones, Manager, 429 Fourth Avenue, Phone Atlantic 1-4835; HOUSTON: John M. Spears, Gulf Coast Manager, Sterling Building, Phone Charter 4626; LOS ANGELES: Donald O. Hanson, Manager, 650 South Grand Avenue, Phone Vandike 0722; ENGLAND: Harry Becker, European Representative, 111 Thorley Lane, Timperley, Cheshire, Phone Ringway 4702.

●

Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1952 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY Speaking

That Dictionary

MONTH or so ago (June 9 issue, to be exact) we told how intrigued we were with a new petroleum dictionary, particularly by the picturesque terms coined by early-day drillers.

Now a few complaints are coming in. Not against us, but against some of the technical definitions. A lot of oil men say that many of the definitions are inadequate or just plain wrong.

We shun all responsibility. The University of Oklahoma Press published the dictionary, and it is now preparing a second and revised edition. To this end it asks all oil men to send in suggestions for improvement and accuracy. We are glad to pass this request along, simply because we think it would be useful for the petroleum industry to have an authoritative and complete dictionary of its peculiar lingo.

Meanwhile we had dreamed up another fanciful tale for no reason except to work in as many quaint expressions as possible. Since these words are not—we hope—in serious controversy (and since we hate to throw the piece away and write something else to fill this space), here it is.

On the Lazy Bench

SIT down on the lazy bench (said the old Digger) and I'll tell you about a blue-sky job I roustabouted in the old El Dorado patch.

This was a rank wildcat on the other side of town from the hot play, and wasn't even in the trend. The rock hounds condemned it but this operator picked up a lease and staked a line well right on the road. He moved in a combination iron pile and spudded with the yo-yo. The driller was an old jarhead who hadn't done much swivelnecking, so when he switched to the rotary he was in a bind.

We ran only the day tour because that was when the suckers came out from town to get the sales pitch, and at night we just circulated. It was drilled tight and the driller kept the log locked in the knowledge box so nobody knew how deep we were. All kinds of stories got around about the formations we topped, but I was sure the driller was stealing hole because I could count stands and tell we weren't making much.

I didn't like the deal but as long as the ghost walked every Saturday I kept buttoned and told everybody we were deep as a tree. Whenever somebody found us down the driller said we were wocsing, but that was a laugh because this was strictly poor-boyed and we were barefooted most of the way to save casing. First thing you know we mudded up and it looked like a P. & A. job to me, but this operator was after blue sky instead of pay and wind oil was enough for him, so he spread the word that he had a show. I knew the cuttings wouldn't stain water, but the next morning there was a rainbow on the mud pit, and I was sure he'd salted her.

Well, the fever was running high, and he sold interests by the bucketful. He must have unloaded a dozen eighths and Lord knows how many sixteenths and thirty-seconds, but before they caught up with him he blew and left the crew holding the idiot stick.

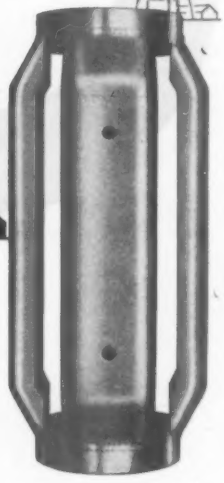
But the payout came 6 months later. I located as a roustabout in the main play, but I heard about it. The royalty interest got back the lease, moved in a workover, cleaned out, set pipe, and deepened. And just when the dough was pinching out they did get a show. They got a moonlighter to shoot it with 20 qt. and she started to belch by heads. It looked like a well, and it started a heavy play. It was called an opener, but it was way low on structure and in a week it was on the beam and good for only 10 bbl., and within a year it went to water and died.

I'll bet the total production never brought as much as the wind oil that promoter managed to blue sky before he skidooed.

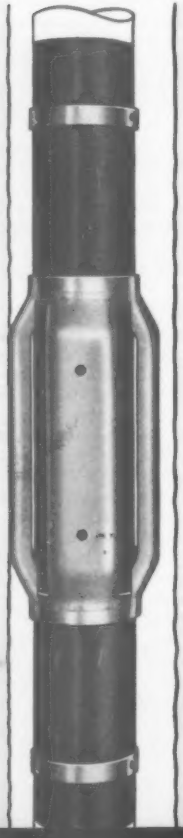
Henry D. Ralph

sooner or later you will want

BAKER rigid type CASING CENTRALIZERS



In line with the long established "Baker Policy" of furnishing the most efficient means of centering your casing, the new Baker RIGID TYPE Casing Centralizer is offered to supplement the outstanding Baker SPRING TYPE Centralizers.



Baker RIGID TYPE Casing Centralizer, Product 9131

CHOOSE THE "TYPE" YOU NEED

If your formations have a tendency to slough off, form cavities, or to wash out, you should continue to use Baker SPRING TYPE Casing Centralizers. The flexibility of the springs permits them to expand and compensate for these variations in hole size and still provide *maximum* centering force.

However, in harder formations, the Baker RIGID TYPE Casing Centralizer (Product No. 9131) is the one to use.

EASY TO INSTALL—POSITIVE CENTERING

The Baker RIGID TYPE Casing Centralizer normally is merely slipped over the casing and allowed to travel freely between collars. If exact spacing is desired, the Stop Collars are spot welded to the casing to prevent *vertical* movement of the centralizer, but to permit *free rotation* of casing while the *centralizer remains stationary*.

Baker RIGID TYPE Casing Centralizers are available to run on casing from 5½" to 9⅝" O.D., to center casing in well bores with minimum gauge from 7⅞" to 12¼". The inflexible "pads" ensure *positive clearance* between the casing and the wall of the open hole when casing is being cemented in harder formations.

FOR RIGID TYPE CASING CENTRALIZERS

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

A hole in the ground may plug a big loss

IT took the petroleum industry a long time to realize that the best place to store crude oil is right in the ground where nature put it.

Now the industry is learning that the best place to store petroleum products in quantity also is in the ground, under conditions as similar as possible to natural reservoirs.

Underground storage of natural gas has been something of a sensation in the industry during the past couple of years. The use of water sands or depleted gas fields for summer storage has eliminated much summer flaring of oil-field gas, prevented winter shortages in consuming areas, and brought operating economies to trunk pipe lines.

OF equal economic importance, though given less public attention, is the current rapid development of underground storage reservoirs for liquefied petroleum gas. It is less than 2 years since this idea was proved practical, but today there are some 70 such reservoirs in use or under construction and a lot more are known to be in the planning stage. Producers and distributors of propane and butane are hiring geologists to probe the countryside for suitable sites.

Consumption of L.P.G. is highly seasonal. But production is—or ought to be—pretty much the same the year around. Most L.P.G. comes from the field processing of gas produced with oil, and oil production normally does not vary much from season to season. Without adequate summer storage these valuable hydrocarbons often suffer waste, both physical and economic.

The fast-growing "bottled gas" industry has been making a valiant effort to induce dealers and consumers to install larger storage tanks to prevent winter shortages and to spread out the use of transportation equipment. Big distributors have installed high-pressure steel storage at strategic points. All this has helped, but the major need was for big-capacity storage at reasonable cost.

UNDERGROUND reservoirs look like the answer. Where the rock is leakproof and contains no contaminating agents, either a natural or a man-made reservoir seems to be as practical as aboveground pressure storage and usually is much cheaper when large capacity is needed. This is particularly true where a cavity can be washed out of a salt bed, but other types of underground reservoirs are proving feasible.

Continued development of underground storage may revolutionize the economics of the L.P.G. industry. If, as it promises, it results in elimination of summer-time flaring of gas or the sale of high-grade products at crude-oil prices, this development's contribution to conservation of natural resources will be tremendous.

GET THESE WELL PERFORATING EXTRAS *with* DOWELL *Perfo-Jet Service*

When you call for Dowell Perfo-Jet Service you get a bonus of extras which pay off in better casing perforating and open hole shooting. These extras give you more accurate gun positioning . . . maximum performance of the shaped charge . . . surer, deeper penetration . . . a junk-free hole . . . less possibility of sticking the gun . . . equipment to meet your well conditions . . . laboratory and field tested methods . . . an active safety program . . . twenty years of experience in oil field servicing.

Contact the Dowell office near you for more complete information about how Perfo-Jet and the many other Dowell Services can help you solve your production problems.

Here Are Extras You Get with Dowell Perfo-Jet

ELECTRIC PILOT EQUIPMENT—The Electric Pilot houses instruments for finger-tip operation and the direct recording of subsurface data. The cable drum, driven by hydraulic motor, is easily and positively controlled. The Dowell sonic collar locator assures accurate gun positioning. With the Electric Pilot truck on the job, the other Pilot Services can be combined with Perfo-Jet on the same trip to your well—Permeability, Spinner, Caliper and Water Location Surveys and Selective Acidizing.

MAXIMUM JET FORMING AREA—The shaped charge used in Dowell Perfo-Jet guns is assembled so that the charge positioning sleeve does not obstruct the critical jet forming area. This Dowell feature allows the jet to give maximum performance—deep, sure penetration through casing and cement into the producing zone.

SELF-DESTROYING GLASS GUN—The expendable Glass Gun, developed by Dowell, carries a larger amount of explosive for greater penetration. When the charges are fired, the glass containers and their aluminum carrier are completely destroyed leaving a junk-free hole. Dowell Glass and steel-type guns are tailor-made in sizes and shooting patterns to fit well conditions. Perforations range from ¼" up to ⅜" in diameter.

RETAINED, THREADED PORT PLUG—This aluminum plug is used in the standard steel-type gun. It minimizes the possibility of sticking the gun and provides proof that a jet has been formed. When the charge is detonated, the central section of the plug is disintegrated; the remainder of the plug is retained in the gun port. The port plug with its O-ring seal has withstood pressures up to 10,000 pounds per square inch in Dowell's laboratory test well.

DOWELL SERVICE

Acidizing · Jel-X · Electric Pilot · Perfo-Jet · Paraffin Solvents · Jelflake
Bulk Inhibited Acid · Chemical Cleaning for Heat Exchange Equipment

DOWELL INCORPORATED • TULSA 1, OKLAHOMA

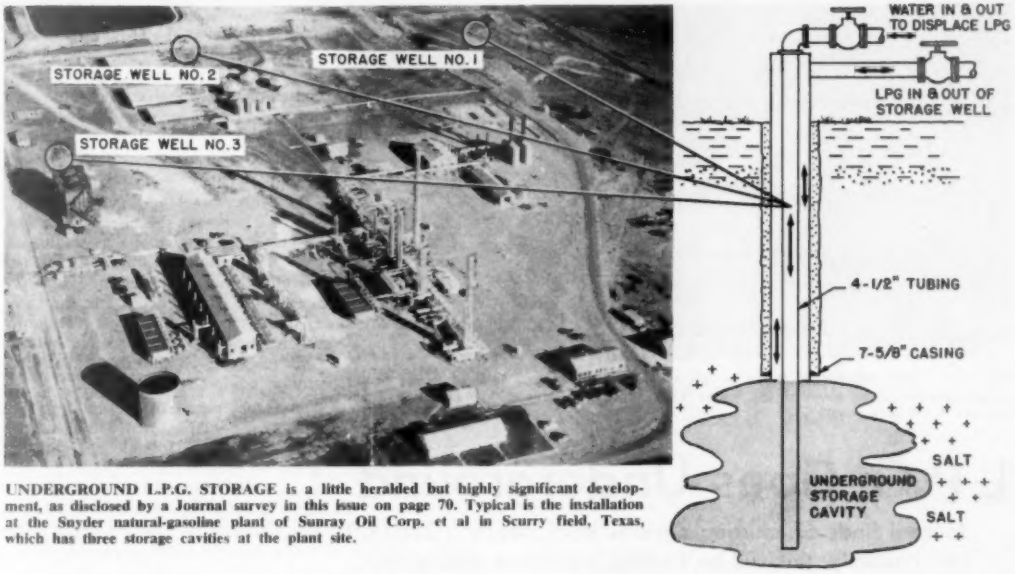
A Subsidiary of The Dow Chemical Company

"First in Oilfield Acidizing . . . Since 1932"

Look to **DOWELL**

FOR OIL INDUSTRY CHEMICAL SERVICE

THIS WEEK



UNDERGROUND L.P.G. STORAGE is a little heralded but highly significant development, as disclosed by a Journal survey in this issue on page 70. Typical is the installation at the Snyder natural-gasoline plant of Sunray Oil Corp. et al in Scurry field, Texas, which has three storage cavities at the plant site.

INTERNATIONAL.—Royal Dutch-Shell takes over 10,200-sq.-mile underwater concession of Qatar. . Concession formerly was held by Superior Oil Co. and relinquished earlier this year. . . . Move marks first time an Iraq Petroleum Co. partner has moved out to operate on its own in the Middle East. . . . ¶Mossadegh given another term as leader in Iran, but his supporters were few. . . . Many members of Iranian Parliament missed the session or failed to vote. . . . ¶Kuwait Oil Co.'s concession-revision agreement extends duration of agreement 17 years through 2026, company reveals. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,109,350 bbl. daily for week ended July 5, down 54,975 bbl. daily. . . . ¶Well completions decreased 1 well to 930 for the week. . . . Wildcat completions totaled 179 compared with 197 for previous week and 200 for same week last year. . . . ¶Rotary rigs operating in United States dropped another 56 rigs to 2,617 on July 7. . . .

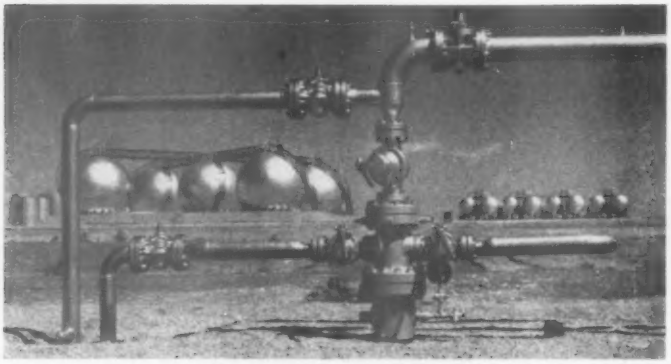
TRENDS.—Indicated demand on refineries for four major products in the 5-week period ended July 5 was only 0.5 per cent greater than in same period last year. . . . Gasoline was up 1.2 per cent. . . . Kerosine demand gained 6.9 per cent. . . . Distillate fuels gained 17.8 per cent. . . . Under influence of steel strike, demand for residuals from United States refineries dropped 13.9 per cent under last year. . . .

RESEARCH.—Many problems must be solved in next 25 years if demands for chemicals and fuels are to be met, President's commission on materials policy reports. . . . Specific problems include new ways to recover oil left in reservoirs, economic method of coal hydrogenation, new techniques for large-scale aromatics production, development of gas turbine, designing engines to get more energy from present fuels. . . .

PIPE LINES.—Work begins on 440-mile products line between Montreal refineries and Ontario consumers. . . . Line will carry wide variety of products for three owning companies, McColl-Frontenac, Shell of Canada, and British American. . . . ¶FPC approves Northern Natural's plan to spend nearly $40,000,000 in expanding its gas-transmission system. . . . Projects would bring company's capacity north of Kansas to 825,000,000 cu. ft. per day. . . . ¶Tuscarora Oil Co. puts into operation new 50-mile section of products system being reconstructed in Pennsylvania. . . . New section connects Freeport with Midland, the Ohio River terminus. . . .

STRIKE EFFECTS.—Increasing shortage of steel due to strike is really hurting oil, and predictions are almost unanimous that the worst has not yet come. . . . Work on pipe lines is slowing noticeably. . . . On some, as on the big Rancho pipe line in West Texas, work has stopped completely. . . . Hurt most of all, however, is the drilling industry. . . . Casing and tubing virtually have vanished except for a small portion of high-priced imported pipe. . . . Consequently, crews are being laid off and rigs stacked. . . . Best estimates obtainable say that about 20,000 oilfield workers will be out of jobs and 1,000 rigs stacked in August if the strike lasts the rest of this month. . . .

PRODUCTION.—Texas-Alberta Oil Corp. buys 2,880 acres of oil and gas properties in the Spraberry trend in Midland and Glasscock counties, West Texas, for about $6,000,000. . . . ¶In other Spraberry action, Texas Railroad Commission rules that operators in the area may not produce wells through the casing to save tubing. . . . ¶Analysis of PAD's new drilling program shows that production will surpass by 1955, if it is carried out, the desired cushion of 25 per cent above actual production. . . . What's more it will nearly bring production to 25 per cent above total domestic demand in that year. . . .



TYPICAL L.P.G. STORAGE WELL is this one near Snyder, Tex., adjacent to the Scurry natural-gasoline plant operated by Sunray Oil Corp. Aboveground high-pressure storage appears in the background.

L.P.G. Goes Underground

Journal finds 67 existing caverns have nearly 1,200,000 bbl. capacity; this will be trebled, new ones prepared

John C. Reidel

EXTREMELY rapid progress in the creation of underground storage for liquefied petroleum gas has been made since the first washed-out salt cavities were put into service less than 2 years ago.

A survey of the industry just completed by The Oil and Gas Journal shows that there are now 67 underground storage reservoirs for L.P.G. in use or under construction. Most of these are in the producing areas of the Southwest, but a significant number are areas of heavy winter consumption.

Present capacity of these reservoirs is approximately 1,191,000 bbl., the equivalent of 4.3 days' production at current rates. Ultimate capacity of all projects now under way will be approximately 3,835,000 bbl., the equivalent of 14 days' production.

Still additional projects are known to be under active consideration, though not yet formally announced, which will raise the ultimate total capacity by some 20 per cent, bringing it to the neighborhood of 4,500,000 bbl.

It's cheaper . . . Economy is the reason for the industry's rush to this new storage method. Adequate storage prevents waste of valuable hydrocarbons, permits natural-gasoline plants to operate at maximum rate throughout the year, and stabilizes the market between winter peaks of consumption of L.P.G.

The conventional method of storing L.P.G. aboveground in high-pressure steel tanks runs into big money when dealing with the volumes required by the L.P.G. industry. And with the industry expanding rapidly and steel supplies uncertain, a new method was badly needed. As soon as it was demonstrated that underground storage was practical and relatively economical, the industry went for it in a big way.

Three kinds . . . There are three types of underground storage suitable for liquefied petroleum gas, but by far the most popular is a cavity washed out of rock salt. Such a cavity is relatively quick, cheap, and easy to prepare. A well is drilled into the salt bed and fresh water is circulated in the hole. The water dissolves the salt and forms a cavity. When the cavity reaches the desired size, L.P.G. is pumped in to displace the water. To recover the L.P.G., salt water is pumped into the hole to displace the product.

Of the 67 underground reservoirs listed in the Journal's survey, 55 are washed out of salt beds or salt domes. Another six are mined from shale or other insoluble formations by hard-rock mining methods. The remaining six are not actually cavities but are natural reservoirs of permeable sandstone or limestone—either water-bearing or depleted oil or gas fields. L.P.G. pumped down under pressure displaces the water in these natural reservoirs.

The type of storage depends chiefly on the nature of the rocks in the area where storage is desired, and on the problems of preventing leakage and contamination. Suitable salt deposits are apt to be common in oil-producing regions, and their location is generally already known by reason of exploration for oil.

Moreover, washing a cavity out of a salt bed is by far the cheapest method of providing storage. Estimates of the cost run around $1.00 or $2.00 per barrel of capacity, varying with the size of the cavity, depth and thickness of the salt bed, drilling costs, difficulty of disposing of the salt water, and nature of the well fittings and aboveground equipment.

A recent report of the National Petroleum Council estimated that storage of approximately 100,000 bbl. capacity could be provided in a typical salt bed at a cost of about 75 cents per barrel, not including aboveground installations and assuming that no geological work is necessary to locate a suitable site.

Where they are . . . Ideally, big-volume storage should be in areas of heavy consumption of L.P.G. to be filled during the summer and emptied during the winter, thus evening out the seasonal load on transportation equipment.

But storage near point of production brings great savings to the industry. Without it, many plants have to reduce output during the summer months, which often means that gas produced with oil is flared in the field instead of being processed. Or liquefied propane and butane are turned into crude-oil pipe lines and sold at crude-oil prices. So field storage conserves petroleum products and brings operating economies.

During the first 4 months of 1952, field processing plants produced an average of 279,000 bbl. of L.P.G. daily. This compares with 246,000 bbl. per day during the same period last year and 238,000 bbl. per day during all of 1951, to show the growth in production. The figures do not include liquefied gases (L.R.G.) produced at oil refineries at the rate of 97,800 bbl. per day during the first quarter of this year.

The Journal's survey of underground L.P.G. storage projects is shown in the table accompanying this article. It was compiled from reports of the Texas Railroad Commission and additional data obtained from individual companies.

From the number of projects recently

Journal Survey Shows These L.P.G. Underground-Storage Projects in the United States

Company and location—	Capacity (bbl.)* Present	Ultimate
The Chicago Corp., Carthage field, Texas	50,000	
Cities Service Oil Co., Lowell, Mich.	30,000	100,000
Enterprise Petroleum Co., Hainesville, Tex.		(M) 50,000
Enterprise Petroleum Co., Hainesville, Tex.		25,000
Freestone Underground Storage Corp., Fairfield, Tex.		35,000
Freestone Underground Storage Corp., Fairfield, Tex.		(B) 35,000
General Gas Corp., Gibsland, La.	80,000	(M) 100,000
General Gas Corp., Gibsland, La.	30,000	100,000
General Gas Corp., Hattiesburg, Miss.		100,000
General Gas Corp., Hattiesburg, Miss.		(M) 100,000
Gulf Oil Corp., Eunice, N. M.	27,000	30,000
Gulf Oil Corp., Fannett, Tex.		(M) 100,000
Lion Oil Co., Scurry, Tex.	5,000	50,000
Lion Oil Co., Scurry, Tex.		(B) 50,000
Magnolia Petroleum Co., La Gloria field, Texas		
Magnolia Petroleum Co., Seeligson field, Texas		
Missouri Hydro Gas Co., Springfield, Mo.		(M) 25,000
National Coop. Refinery, McPherson, Kans.		50,000
Petroleum Sales, Easton, La.		(M) 75,000
Petroleum Sales, Easton, La.		50,000
Phillips Petroleum Co., Borger, Tex.	50,000	50,000
Phillips Petroleum Co., Borger, Tex.	50,000	50,000
Phillips Petroleum Co., Kankakee, Ill.		
Phillips Petroleum Co., Goldsmith, Tex.		100,000
Pure Oil Co., Jal, N. M.	65,000	150,000
Pure Oil Co., Dollarhide field, Texas		75,000
Pure Oil Co., Dollarhide field, Texas		75,000
Richardson & Bass, Keystone field, Texas	25,000	50,000
Richardson & Bass, Keystone field, Texas		
Sid Richardson Gasoline Co., Kermit, Tex.	70,000	100,000
Sid Richardson Gasoline Co., Kermit, Tex.	50,000	(M) 100,000
Sid Richardson Gasoline Co., Kermit, Tex.		100,000
Shamrock Oil & Gas Corp., Panhandle field, Texas		
Shell Oil Co., Denver City, Tex.		50,000
Shell Oil Co., Denver City, Tex.		50,000
Skelly Oil Co., Skellytown, Tex.	57,000	60,000
Skelly Oil Co., Skellytown, Tex.	60,000	(B) 60,000
Skelly Oil Co., Skellytown, Tex.	20,000	(B) 60,000
Skelly Oil Co., Eunice, N. M.	48,000	100,000
Skelly Oil Co., Eunice, N. M.		(B) 100,000
Southern Minerals Corp., Stratton field, Texas		
Stanolind Oil & Gas Co., Ulysses, Kans.	25,000	(B) 25,000
Stanolind Oil & Gas Co.,† Goldsmith, Tex.	22,000	50,000
Stanolind Oil & Gas Co.,† Andrews, Tex.		50,000
Stanolind Oil & Gas Co.,† Andrews, Tex.		50,000
Suburban Propane Gas Corp., Syracuse, N. Y.		25,000
Sun Oil Co., Beaumont, Tex.		(B) 100,000
Sun Oil Co., N. Sun field, Texas		
Sunray Oil Corp.,† Scurry, Tex.	42,000	75,000
Sunray Oil Corp.,† Scurry, Tex.	60,000	(B) 100,000
Sunray Oil Corp.,† Scurry, Tex.	40,000	(M) 100,000
The Texas Co., Souriake, Tex.		(B) 100,000
Texas Natural Gasoline Co., Rankin, Tex.	120,000	120,000
Texas Natural Gasoline Co., Rankin, Tex.	80,000	(B) 120,000
Texas Natural Gasoline Co., Rankin, Tex.	60,000	(B) 120,000
Tex Harvey Gasoline Plant, Inc.,‡ Midland, Tex.		30,000
Tex Harvey Gasoline Plant, Inc.,‡ Midland, Tex.		(B) 30,000
Tex Harvey Gasoline Plant, Inc.,‡ Midland, Tex.		30,000
Tex Harvey Gasoline Plant, Inc.,‡ Midland, Tex.		(M) 30,000
United Petroleum Gas Co., Maiden Rock, Wis.		120,000
Warren Petroleum Corp., Breckenridge, Tex.	25,000	(M) 25,000
Warren Petroleum Corp., Breckenridge, Tex.		(M) 30,000
Warren Petroleum Corp., Arcadia, La.		
Warren Petroleum Corp., Hattiesburg, Miss.		
Warren Petroleum Corp., Tyler, Tex.		100,000
Warren Petroleum Corp., Monument, N. M.		
Warren Petroleum Corp., Eola, Ill.		
Total	1,191,000	3,835,000

*Propane is stored except as noted: B = butane, M = mix. †Operator of jointly owned facilities. ‡Joint venture of Anchor Gasoline Corp. and Arthur Harvey.

started, and from information that many producers and distributors are actively hunting for additional sites for underground storage, it is evident that this development will continue at a rapid rate. Within a year or two capacity to store L.P.G. should be much larger in terms of days' production in spite the expected increase in output.

NATIONAL AFFAIRS

Future Need: Research

Better recovery, more efficient use of fuels, economic coal hydrogenation highlight seven "must" developments

Bertram F. Linz

WASHINGTON.—A tremendous field of research in hydrocarbon technology must be covered in the next 25 years if all the varied chemical, fuel, and other needs of our economy are to be met.

The oil and gas industry has effectively met the challenge of supply in the fields of discovery and refining, the President's Materials Policy Commission conceded in its voluminous report on "Resources for Freedom." But it has yet to learn how to get much more than a 50 per cent recovery from a well and how to use automotive fuels with an efficiency greater than 15 to 25 per cent, the commission said.

The commission's intensive study of materials problems showed there are seven specific jobs which must be done in hydrocarbon resources:

. . . **Discover new reserves.**

. . . **Develop economic techniques** for recovering the approximately 100,000,000,000 bbl. of oil left behind in old pools.

. . . **Develop economic methods** of coal hydrogenation to bring about the simultaneous production of chemicals (especially benzene and phenol) and liquid fuels.

. . . **Develop techniques** for large-scale production of aromatic chemicals, especially benzene, not only by dehydrogenation of naphthenes but also by cycling and otherwise processing straight-chain hydrocarbons.

. . . **Complete development** of oil production from shale.

. . . **Develop the gas turbine** for automotive use to make possible the utilization of more available liquid fuels without antiknock properties.

. . . **Develop more efficient** power production direct from liquid and gaseous fuels through improved engine design.

Reserves outlook . . . Within the limits of materials availability, the oil and gas industry is vigorously and successfully seeking new oil and gas reserves, and the commission believes that future discoveries will be considerably more.

WATCHING WASHINGTON

Bertram F. Linz

Oil Cushion for War

Oil in the ground is a national asset in a time of emergency, but the mere knowledge it is there gives it no value for emergency use.

On this basis the President's Materials Policy Commission, in its review of future supply problems, holds that to make its greatest contribution in time of war the petroleum industry should have ample semiproved and semideveloped pools so its drilling efforts will not be wasted on dry holes and so its crude production can be held high and expanded.

Further, the commission said, it is not enough to have oil in the ground; there must be facilities for extracting and processing it. But it admitted that the building of stand-by capacity is a costly method of assuring extra supply for defense.

Nowhere in its report did the commission express approval of locked-in, undeveloped reserves. Even in the case of the Continental Shelf, in which many in government favor establishing such reserves, it emphasized the need for development, with spacing and withdrawal requirements aimed at prolonging the life of the pools but with a view to providing faster withdrawals if ever such action is required to meet the needs of war.

Doodlebugging Deluxe

It's about time for return of the doodlebug, latter-day style.

The doodlebug originally was a hazel or willow fork which, in the hands of the proper mystic, located underground water and later "found" oil. After electricity was developed it took the form of an electrical gadget replete with buzzers and bells, and later, with the advent of radio, it underwent further improvements.

Soon it is probable the woods will be full of "atomic experts" who might be, were, or would like to be connected with the Atomic Energy Commission, equipped with atomic oil finders using mezon radiation, positron radiation, or perhaps a modified form of nuclear fission to locate deposits at great depths.

These radiations, they will assure the credulous (and the credulous, like the poor, are always with us) will locate oil at much greater depths than mere electricity. That will be a break for the oil prospector, for one slide-rule wizard figured that to send an electrical impulse that would find oil as close to the surface as 500 ft. would require a power plant large enough to light New York City, which is a little too much to haul around in a swamp buggy.

Brake on Amortization

The Defense Production Administration is slowing down the tax-amortization program and is advising industrialists to consult with the appropriate government agencies before planning new expansion programs for which they will seek tax aid.

Many of the programs for which tax certificates have been issued are reaching expansion goals, at which point the tax incentive will be cut off.

Definite programs for domestic and foreign petroleum and lubricating oil have been prepared by the Petroleum Administration for Defense; the Maritime Commission has a program for ocean-going tankers; and the chemical division of the National Production Authority has a number of chemical programs including butadiene, carbon black, and sulfuric acid.

Steel Squeeze

Production and pipe-line activities in the oil industry are decelerating rapidly as the brake on pipe supplies put on by the steel strike grows tighter.

Refinery projects for the most part already had on hand, when the strike started, all the steel they will need for the third quarter, and the same is true of most storage projects.

Wildcat wells were not affected quickly by the strike, because in probably a majority of instances they have already been blocked out and the steel acquired. Development work, however, was slowing down, and Petroleum Administration officials are watching the periodic reports on active rigs to see how new starts are falling off.

In pipe-line construction, officials said that many companies are working on a 15 to 30-day lead time and that a number of projects were coming to a halt.

rather than less, than a 1948 estimate that they would equal the amount of oil withdrawn up to that time plus the then-proven reserves—approximately 54,000,000,000 bbl.

On the basis of the experience since then, with the discovery in 4 years of about 14,000,000,000 bbl. of new reserves, or over 25 per cent of the 54,000,000,000 estimated, the commission found a presumption that considerably more oil remains to be found than the 1948 estimate indicates.

"Past estimates of ultimate discovery have all turned out to be much on the low side," the report commented, "and while this does not necessarily apply to all subsequent estimates, it does support the conclusion that future prospects for oil production must be inferred continuously from the success currently being encountered in exploration and discovery rather than from estimates of how much may ultimately be discovered."

Much research also is being carried on on secondary-recovery methods from which the industry expects, when they are perfected, to recover ultimately about as much oil from old wells as it has already taken out of them.

Reviewing these and other factors in the energy situation, the commission asked and answered the question, "Will there be enough hydrocarbons for all needs?"

"There should," it said, "because processes are being developed for making hydrocarbon products from shale, coal, lignite, and possibly tar sands. Some of these are currently almost ready for straightforward commercial development. Hydrocarbon technology permits tremendous interchangeability in making any of the required end products from any of these sources."

Petrochemicals future . . . A highly important field of research has opened up in the nonfuel utilization of hydrocarbons in which the petroleum and chemical industries together already have achieved "outstanding triumphs," the commission said.

This use, though small, is extremely important. In 1950, it represented 0.7 per cent of total hydrocarbon consumption, and even at a growth rate during the next 25 years which is expected to multiply by six the total tonnage of nonfuel hydrocarbon products such consumption will represent only about 2.7 per cent of the total hydrocarbon requirements at that time.

Nonetheless, the commission predicted, by 1975 the United States will obtain from this source most synthetic rubber, plastics, synthetic fibers, solvents and other chemicals.

This is seen as a tempting field for the industry, since it is estimated that such products increase the value of the hydrocarbon raw material approximately 12 times, while conversion to fuels increases it only 1½ times.

Aromatics from coal? . . . While it is anticipated that most of the chemical needs can be supplied from petroleum, it may be necessary to go to coal to keep up with the ever-increasing demand for benzene and phenol, the commission indicated.

"Aromatic chemicals from petroleum have become more and more important as the quantity of these obtained as byproducts of coke production has become insufficient for requirements," the report said. "Because of the tremendous growth in those requirements expected during the next quarter century for the manufacture for plastics and other chemical end products, active investigation is under way to seek the best sources for additional supplies of these materials.

"Certain of them, especially toluene and the xylenes, are now being supplied in ample quantity by the petroleum industry and can undoubtedly be supplied in the much larger quantities which will be required. However, benzene and phenol may present some difficulties. The naphthenic components of petroleum from which benzene is easily made are not too plentiful; other methods of producing benzene from petroleum are expensive. Phenol must be synthesized from benzene if no other source is available.

"However, in coal hydrogenation, benzene is obtained easily and in large proportion, and substantial quantities of phenol are obtained directly without further processing. This fact may make coal hydrogenation for chemicals, with liquid fuels as a byproduct, an economic operation. Because the tonnage of chemicals required is small relative to liquid fuel needs, this arrangement will not contribute substantially to liquid fuels. But it will help solve the aromatic chemicals problem for benzene and phenol, if the answer is not entirely provided by the petroleum industry.

"Proponents of aromatic chemical production both from coal hydrogenation and from petroleum are confident that this supply problem can be solved, either by using coal hydrogenation plus petroleum, or production from petroleum alone."

Exports Increase

WASHINGTON.—Exports of major petroleum products increased to an average of 278,600 bbl. daily for the week ended June 13 from 237,300 bbl. daily in the preceding week, the Petroleum Administration for Defense reported.

The heavy increase was due principally to a sharp jump in distillate shipments. Aviation gasoline shipments also showed a considerable increase, and kerosine exports were up slightly. Both motor gasoline and residual showed declines.

Shipments for the week, compared with the preceding week, and the average for 4 weeks ended June 13 are shown, in thousands of barrels, in the accompanying table:

	Week ended June 13	Week ended June 6	Average 4 weeks
Aviation gasoline	46.4	26.3	19.2
Motor gasoline	7.7	12.5	12.5
Kerosine	25.4	24.2	17.4
Distillate	146.5	85.7	99.1
Residual	52.6	88.6	68.6
Total	278.6	237.3	216.8

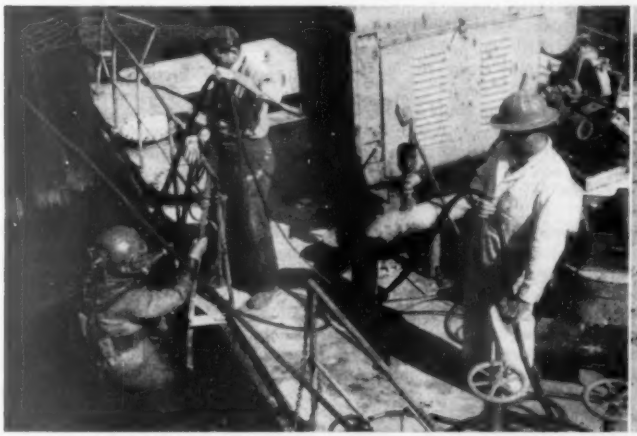
Legislative Recap

Congress quits work with many oil bills still pending

WASHINGTON.—The Eighty-second Congress legislated itself out of business last week, leaving the oil and gas industry pretty much where it found it January 3, 1951.

With the adjournment of the session thousands of pending measures died, including about 100 affecting the industry. About 25 of the bills on which Congress took no action applied to the tidelands controversy, another dozen related to synthetic fuels, and about as many dealt with public lands and leasing.

Major matters of unfinished business were the President's veto of the bill



GOING DOWN into the Calcasieu River for inspection . . .

LOOKING DOWN into a Texas shot hole . . .

Water and Sunbeams . . .

. . . play a part in the oil industry's diversified activities, as illustrated by these Cities Service pictures which show some extremes in occupations and environment characteristic of petroleum operations. The diver is getting ready to inspect pier footings and underwater installations at the Cities Service refinery at Lake Charles, La. The seismograph driller at right uses a mirror to reflect sunlight into his shot hole for a check before lowering a charge of dynamite.

restoring title in the tidelands to the states and his nomination of Thomas C. Buchanan for another term on the Federal Power Commission.

What remains . . . The tidelands situation remains in the stalemate which has held it for the past several years. With an assurance from Interior Secretary Oscar L. Chapman that he will not attempt to circumvent Congress by stretching any existing law to get federal management of the offshore oil reserves under way, the 1953 Congress can make another attempt to settle the controversy, under a new president whose views may differ from those of the present administration.

The Buchanan appointment, subject to considerable opposition when it came up for hearing, was shelved by the Senate commerce committee. The President immediately gave Buchanan a recess appointment which will keep him in office until the Senate confirms or rejects it.

In the last days of the session, Congress passed legislation exempting local gas companies, which themselves did not engage in interstate business, from Federal Power Commission regulation. But a last minute attempt failed to get House action on a bill growing out of the Standard Oil Co. (Ind.) decision, making good faith a valid defense against charges of price discrimination.

Budget cuts . . . As a result of the congressional drive for economy, the Petroleum Administration for Defense faces a cut of anywhere up to 22½ per cent in the fund it will get for the new fiscal year.

Cutting back appropriations sharply for all of the emergency agencies, Congress gave the Interior Department only $3,100,000 for all of the defense organizations under its control. The 1952 appropriation for the same organizations was $4,000,000.

As Congress prepared to quit, President Truman asked the Senate to send back to the White House the long-forgotten Anglo-American oil agreement signed by the late Secretary of the Interior Harold L. Ickes in London in September 1945. That agreement, designed as the basis for a projected world-wide agreement on the distribution of world oil supplies, never was ratified by the Senate.

Paley Report Followed Up

WASHINGTON.—An immediate follow-up on the voluminous report of the President's Materials Policy Commission (or Paley commission) was ordered this month by President Truman.

The President ordered the National Security Resources Board to set up a task force representing the various agencies concerned with the materials problem to study the commission's recommendations and submit proposals for carrying them out by September 1. The Bureau of the Budget was given a similar period in which to study and report on the operations of the federal agencies with respect to the materials problem.

In its report, the commission submitted more than 70 recommendations designed to deal with the problems to be faced over the next 25 years in securing basic raw materials in adequate supply for our expanding economy.

A number of recommendations were made with respect to the expansion of petroleum supplies *(The Oil and Gas Journal, June 30, page 41)* and to deal with the problems foreseen in natural gas *(The Oil and Gas Journal, July 7, page 46)*.

While the President asked for complete recommendations from the government agencies, he emphasized his concurrence in the view of the commission that much of the work of anticipating and dealing with raw-materials problems will have to be done by private industry. He submitted the report to Congress for study by interested Senate and House committees but did not call for any immediate legislative action.

More Investigations Due

WASHINGTON.—The Truman administration's campaign to keep the Democratic Party in power for another 4 years may make the oil industry a political football.

This could be done simply by turning the Department of Justice loose on the industry, and there have been reports that new Attorney General McGranery has been given the go-ahead signal.

The department at all times has a big file of oil matters which are under more-or-less constant review. These, as well as matters in other fields, were reported to McGranery when he was "briefed" on departmental activities when he took office, and reportedly he has checked a number of them for action.

The department is expected to move into both the domestic and foreign operations of the industry. Its action will be based upon prices and marketing practices at home and abroad, and will have little or no relation to production.

In moving against companies operating abroad, the antitrust division is expected to concentrate more closely on oil from areas other than the Middle East although, since the companies operate all over the free world, that area probably will be involved to some extent.

Congress next year also is expected to get into the foreign situation, looking into the Federal Trade Commission's report charging that a cartel exists among American and foreign oil companies.

Gas-Processing Goal Raised

WASHINGTON. — The Defense Production Administration has approved an expanded program of natural-gas liquids production worked out by the Petroleum Administration for Defense.

The original PAD expansion program for the coming 18 months called for an increase in natural-gas processing capacity to make 43,000 bbl. per day more natural-gas liquids in the last half of this year and 88,000 bbl. daily in 1953 to lift output to approximately 751,000 bbl. daily by the end of next year.

The revised program calls for an increase of 60,000 bbl. daily this year and 120,000 bbl. daily in 1953 to raise the total to 1,040,000 bbl. by the end of next year.

This segment of the industry is extremely active, and applications for certificates for accelerated amortization of new facilities filed with PAD greatly exceeded the goal of the original program and reportedly are close to the new, higher figure.

Emergency Plan Dropped

WASHINGTON.—Operations under the voluntary agreement set up a year ago to meet the situation created by the loss of Iranian oil have been terminated by the Petroleum Administration for Defense.

Provisions for the creation of local industry-advisory councils adopted during the refinery strikes last May also have been revoked.

Both plans have served their purpose, Interior Secretary Oscar L. Chapman said, and are being closed out in advance of their fixed termination dates in keeping with the policy of eliminating regulations as soon as they have served their purpose.

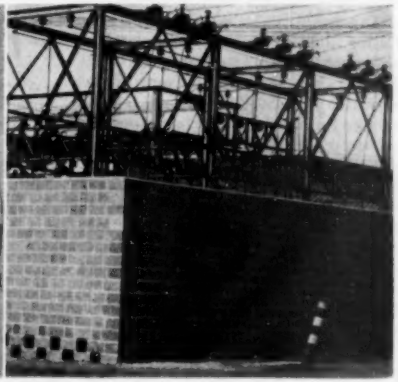
Under "plan of action No. 1," devised to deal with the supply dislocations caused by the difficulties in Iran, 19 American companies made exchanges or sales with the 3 companies that had been dependent upon Iran involving 19,429,000 bbl. of crude and 26,558,000 bbl. of refined products.

FENCE PATROL keeps a constant vigil on Esso Standard's 17 miles of wire fence around the Baton Rouge refinery.

RADIO-EQUIPPED CARS are in constant communication with headquarters during routine inspections of the plant.

RAILROAD CARS are checked to make sure no suspicious persons or packages enter.

MICROFILMS insure safety of irreplaceable company records.



SOLID WALLS of concrete blocks guard critical facilities from accidental or intentional damage.

Security at Work

Esso Standard's Baton Rouge refinery is prepared for an emergency; here's how the plant guards against sabotage

F. Lawrence Resen

BATON ROUGE.—At Esso Standard Oil Co.'s refinery here they're locking the barn before the horse is stolen.

Since the outbreak of Korean hostilities, the company has been operating a continuing program of plant security. It is designed as insurance that the nation's largest refinery will remain on stream, unaffected by sabotage or violence which may be precipitated by communists or other subversives should the present "limited emergency" develop into war.

Two years ago this month H. J. Voorhies, vice president and refinery general manager, named a refinery-security committee to study the local situation and recommend action. At the same time he appointed a fire committee to study means of improving fire-protection facilities.

Outgrowth of the committee's work can be seen in the streamlined program at Baton Rouge, where a constant vigilance is maintained.

The program . . . Esso starts from the ground up in its measures. It gives its employes tamper-proof identification, then fingerprints them as a further means of identification. Each also is given booklets on atomic warfare.

The plant-protection department has a fully staffed guard detail, including radio cars operating from the office of the emergency coordinator, for maintaining a round-the-clock vigil.

A comprehensive fire-fighting course is given employes most likely to be involved in the event of an emergency. A special training ground is provided where fires of various types are started and the trainees receive instruction and actual experience in extinguishing them.

Benefits . . . Esso Standard figures that the program will give a return over and above that of security against espionage and sabotage. Even if these dangers pass in the near future, the company expects to benefit by:

. . . Improved efficiency in fire-fighting—an important consideration in any plant continuously handling highly volatile materials.

. . . Better first-aid training throughout the plant. Sound instruction widely disseminated can prevent fatalities in many serious accidents and lessen the effects of others.

. . . Permanent records. Storage of microfilmed records insures retention of irreplaceable data which might be destroyed by accidents within offices, such as a localized fire.

Strike Cuts Activity

Lack of steel means drop in well completions, delay in finishing important pipe lines; idle workers a prospect

THE shortage of steel is really hurting the oil industry, and everyone agrees the situation will get worse before it gets better.

Pipe laying stopped last week on the big Rancho crude line from West Texas.

Work is slowing down on several other pipe lines under construction. Operators are putting off letting contracts on various portions of the projects. Pump-station construction is generally continuing, though delays in getting equipment are anticipated later.

The drilling industry is hit the worst. Casing and tubing are virtually unobtainable, except for some imported goods being peddled at fancy "gray market" prices. As operators' stocks of pipe dwindle, rigs are being stacked and crews laid off.

Even if the steel strike ends immediately there will be 600 drilling rigs idle within a week, it is predicted by A. W. Thompson, president of the American Association of Oilwell Drilling Contractors. If the steel mills remain idle the rest of this month, Thompson says, 1,000 rigs will be down in August.

Figuring a crew of 15 to 20 men per rig, this presents a prospect of upwards of 20,000 oil-field workers out of jobs within a few weeks.

Completions to drop . . . At the moment the chief effect of the tubular-goods shortage is postponement of drilling scheduled to start in July. Operators are spreading out their steel inventories by drilling only the most important prospects, the shallower wells, and those urgently required by lease or offset obligations.

This situation will show up on the well-completion reports later in the year and even into 1953, as steel alloted for future quarters is being used now where possible. Wildcat wells will be curtailed relatively more than development drilling in future schedules, which may have an effect on the rate of discovery of new fields during the next several months.

Most drilling is done on contract but many big operators run some rigs of their own. The natural tendency is for these to use what steel they have to keep their own rigs and crews busy, and to make no new deals with contractors. But the big companies are having trouble, too.

"You can't even trade pipe or borrow any on the slim prospects of being able to return it later," complained L. A. Sunkel, vice president of Atlantic Refining Co., Dallas.

Specific cases . . . Atlantic figures it has already lost one month's drilling out of its 1952 schedule. This company has one important exploratory well which it can't complete for lack of casing, but in an effort to save the well the rig and crew are standing by, idle, at a cost of $2,000 daily.

Sun Oil Co. officials tell a similar story. Their drilling operations are only 50 per cent of schedule, and this may be halved again within 2 weeks. A month ago Sun had 40 rigs running in Texas; by August this may be down to 9.

Other operators are faring little better. Magnolia Petroleum Co., for instance, made 30 new locations to drill during the first half of June; half of those have been cancelled and during the last 2 weeks of the month the company made only six new locations, all where immediate drilling was obligatory.

District offices of the Texas Railroad Commission report that applications to drill new wells last week were down to about half the normal number.

Productivity Trend

Capacity to produce crude oil would soar as a result of PAD's still-tentative program of 65,000 wells in 1955

WASHINGTON. — PAD's contemplated new program for drilling 65,000 wells in 1955 will raise the nation's capacity to produce crude oil well over the desired cushion of 25 per cent above actual production and bring it close to 25 per cent above total domestic demand in 1955.

This big drilling program is not official yet, but members of the Petroleum Administration for Defense are talking it up and are working on plans to get the necessary steel in case the program is adopted.

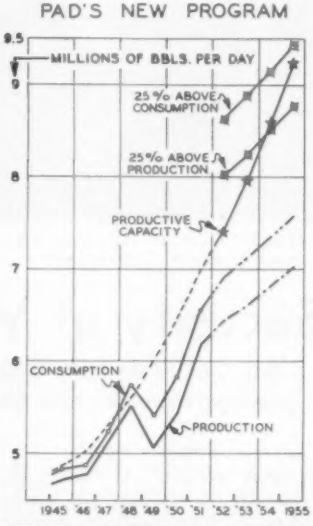
The approved PAD program calls for drilling 55,000 wells in 1953. The agency would like to step this up by 5,000 wells each of the next 2 years—a total of 60,000 completions during 1954 and 65,000 during 1955.

How this would affect the United States' capacity to produce crude oil is shown in accompanying chart. It projects estimates of actual production, total consumption (including imports), and anticipated producing capacity through 1955. The future producing capacity is extrapolated on the basis of past discovery successes applied to the proposed rate of completions.

Productivity forecast . . . The stars on the chart show PAD's estimates of productive capacity in future years if its proposed drilling program is carried out. As can be seen at a glance, productive capacity will go up much faster than either actual production or rate of consumption.

By 1954 the country will have a reserve capacity at least 25 per cent above actual production—a goal set by the military as highly desirable as a measure for national defense. By the end of 1955 total producing capacity will be almost 25 per cent above expected total domestic consumption in that year—thus providing a cushion to oil a war with imports virtually shut off.

These estimates for the future are



CRUDE-OIL PRODUCTIVE CAPACITY in the United States will be more than 25 per cent above actual production and almost 25 per cent above domestic consumption in 1955 if PAD goes through with its proposed program for drilling 60,000 wells in 1954 and 65,000 in 1955.

based on the assumption that there will be only a normal increase in demand, not the sharp increase that would come with war. The increase in producibility assumes that production conditions will remain constant, with no great change in present well-spacing, secondary-recovery, or other practices.

Such conditions, plus the projected big drilling program, should give the United States a productive capacity of approximately 9,250,000 bbl. per day by the end of 1955, PAD calculates.

Wells going deeper . . . Wells will get deeper each year, and the average depth of all wells will increase by about 100 ft. each year, PAD figures. This will mean that wells drilled in 1955 will average at least 4,200 ft. in depth.

The tonnage of tubular goods needed to support such a drilling program has also been computed by PAD. It estimates that the oil industry will need at least 2,750,000 tons of casing and tubing (not counting drill pipe) to drill 60,000 wells in 1954, and perhaps 3,100,000 tons to drill 65,000 wells in 1955. This estimate for 1955 is 50 per cent higher than the actual production of casing and tubing in the United States in 1950.

Gas Records Coming

Capital expenditures to hit another all-time high next year, A.G.A. predicts; outlook through 1956 is optimistic

THE natural-gas industry's postwar program will set new records in 1953.

Next year the industry is expected to spend $1,571,000,000 for production facilities, pipe lines, underground-storage projects, and other construction, according to the annual forecast of the American Gas Association.

A new peak in the tremendous postwar expansion program might have come this year had it not been for shortages of materials which led to government allocations, the A.G.A. said.

The construction forecast covers the 5-year period beginning at the first of this year and is based on an analysis of projects outlined by companies representing 95 per cent of total revenues of the gas industry, including both natural and manufactured-gas companies.

Forecast of a record-breaking year in 1953 is based on plans for major expansions of existing systems expected to be started next year, together with construction of two major pipe lines. These are the proposed line from the Gulf Coast area to the Middle West and another which would serve the Pacific Northwest with natural gas from either Canada or the Southwest.

Next 5 years . . . Construction of the natural-gas industry during the 5-year period through 1956 will total about 5.1 billion dollars, an 11.8 per cent increase over total expenditures during the 5-year period ending in 1951, the A.G.A. said.

However, the A.G.A.'s forecast historically has been far below actual expenditures and if this is true in the current forecast, the capital layout during the next 5 years will be far in excess of that spent during the past 5 years.

For 1954 the A.G.A. predicts the entire gas industry (manufactured and natural) will spend $1,304,000,000, more than the 1951 forecast but less than either 1951 or 1953. However, if the forecast follows its past record in being well under actual expenditures, 1954 could well be another all-time high in gas-industry expansion.

How it's divided . . . More than 90 per cent of all current and future expenditures are within the natural-gas branch of the industry.

Expenditures of the manufactured-gas industry for 1952 and the next 4 years total estimated $496,000,000, which is less than it spent during the past 5 years. All the gain, therefore, is represented by the expansion of producers, transporters, and distributors of natural gas.

Of the natural-gas expenditures, by far the lion's share will go toward additional transmission lines, with distribution lines and production facilities taking next call on the capital funds.

A total of $40,000,000 is expected to be spent this year on underground gas storage, with only half that scheduled in 1953 and lesser amounts planned in following years. Here again, however, is involved the factor of conservation in the A.G.A. forecast.

Details of the A.G.A. forecast are contained in the accompanying table.

CONSTRUCTION EXPENDITURES, 1951-1956
(Millions)

Type of gas and Plant function	Actual	Forecast					Total forecast	Total actual
	1951	1952	1953	1954	1955	1956	1952-1956	1947-1951
Natural gas-total	$1,363	$1,067	$1,571	$1,206	$645	$610	$5,099	$4,560
Production	124	91	102	72	75	75	415	511
Transmission	867	607	1,133	820	275	240	3,075	2,939
Underground storage	42	40	20	12	5	5	82	*
Other storage	15	5	6	12	10	5	38	*
Distribution	271	279	279	264	255	260	1,337	958
General	44	45	31	26	25	25	152	152
All other types gas-total	98	106	110	98	91	91	496	586
Prod. and storage	19	31	39	29	23	28	150	221
Transmission	6	1	2	2	4	2	11	23
Distribution	66	10	62	61	55	54	302	314
General	7	4	7	6	9	7	33	28
Total industry-total	1,461	1,173	1,681	1,304	736	701	5,595	5,146
Production and other storage	158	127	147	113	108	108	603	732
Transmission	873	608	1,135	822	279	242	3,086	2,962
Underground storage	42	40	20	12	5	5	82	*
Distribution	337	349	341	325	310	314	1,639	1,272
General	51	49	38	32	34	32	185	180

*Included in production

Oil's Scrap Efforts Lauded

WASHINGTON.—The oil industry has been congratulated by Deputy Petroleum Administer J. Ed Warren on its accomplishments in collecting scrap for the steel industry—and asked to continue its efforts even though the steel strike has resulted in large accumulations.

"When the steel strike finally is settled," Warren warned in a letter to some 20 oil and gas trade associations, "the expanding steel industry will undoubtedly resume production at a record rate. There will then be a danger that the increased demand for scrap will exceed the rate of collection, eating away the safe working margin of present inventories."

How rapidly the scrap situation fluctuates between scarcity and surplus was illustrated only a few weeks before the steel strike when some furnaces had to shut down for lack of scrap. Currently the inventories of scrap at steel plants are above 60 days' supply, and the National Production Authority is reducing its salvage division and shortly will revoke its auto-wreckers order

designed to bring out dormant scrap.

"The job you have done in the scrap program was most effective and contributed greatly to the defense effort," Warren told the associations. "It is hoped that your association will stand ready to again mobilize its members if and when the need should arise."

Plant-Security Plan Ready

WASHINGTON.—A complete facility-security program for the oil and gas industry has been worked out by the Petroleum Administration for Defense.

The military and other agencies interested in industry security have been lined up, and PAD is preparing to take its program to the industry through a new facility-security office which will supersede the facility-security division.

The new office will be headed by Richard L. Allbritain, formerly chief of the plans and standards branch of the division.

Hydrogenation Cost Studied

WASHINGTON. — The Bureau of Mines is making a case study of the costs of operating a small coal-hydrogenation plant designed to produce chemicals with synthetic liquid fuels as a byproduct.

The study is being conducted at the bureau's Louisiana, Mo., laboratory. The plant would be of 3,500 bbl. daily capacity and its output would be divided about 50-50 between chemicals and liquid fuels.

In the past, the bureau has concentrated on studies of the operation of large plants which would be designed primarily for liquid fuels production with chemicals as a byproduct, but its figures showed that to insure an adequate return on investment such a plant would have to depend upon chemicals for a substantial part of its volume in both quantity and value.

Industry Briefs

HOUSTON.—Drilling & Exploration Co., Inc., Houston, has purchased for $533,000 oil interests of the Warren Wright estate and associates in 21 gas wells in Lisbon and North Lisbon fields in Louisiana. The company also obtained deep mineral rights in all estate lands.

DALLAS.—American Petroleum Co. of Texas has sold its Texas properties for a reported $1,000,000 to Colombian Carbon Co. Properties included leases on about 20,000 acres. American Petroleum is moving its offices to Los Angeles.

MIDLAND.—Tennessee Production Co., Houston, has acquired an equity worth a reported $5,000,000 in M. & M. Production Co., Midland. M. & M. properties include 61 oil wells in Crockett and Howard counties in Texas and in Lea County, New Mexico, and leases on 2,000 proven acres and considerable unproven territory. Tennessee Production acquired all the outstanding stock of York & Harper, Inc., Midland, last January involving properties in West Texas and New Mexico.

WICHITA, Kans. — Trans-Era Oil, Ltd., of Toronto, Canada, is reported to have purchased properties of B. & R. Drilling, Inc., of Russell, Kans., one of the largest and most aggressive independent contractor-producer firms in the state. Sale price is reported to be $2,500,000 for 10 rotary rigs and 120 producing oil wells on 100 leases. The firm was founded by C. L. Roberts and H. C. Bennett.

ROCKY MOUNTAIN

New Drilling Mark

Three-state area scores record gain in first half

DENVER. — Rocky Mountain operators are setting an unprecedented drilling pace for this area.

During the first half of this year, they surpassed by far all records for completions in the three-state area of Wyoming, Colorado, and Montana in equivalent periods by pushing down 665 wells in all classes.

This is 25 per cent more than were drilled during the first half, last year.

Wyoming came in first with 332 wells of all classes completed from January-June and also topped the list of 363 oil completions with 208.

Wildcat completions are up 58 per cent in the 3-state area with Colorado leading with 93—19 of which were successful. In Wyoming 16 wildcats hit commercial pay, while two were successfully completed in Montana.

These figures reflect the most active drilling campaign in the history of the region. The Oil and Gas Journal forecast the first of this year that 1,362 wells would be drilled in this area. So far operators are following this prediction closely.

Casing caution . . . The current steel strike, however, may cause a slackening of this pace. Reliable reports show many operators now are putting their available casing into development wells in view of the increased crude outlet in sight with the completion of the Platte pipe line.

The count of active rotary rigs in the entire Rocky Mountain region climbed to an all-time high of 244 in June. The previous record of active units was 209 in late 1951. Most of Wyoming's active rigs are working on development locations, while Montana's rigs for the greater part are working wildcat areas. As in the past, the majority of Rocky Mountain rigs are active in the Denver-Julesburg basin areas.

SOUTHWEST

Spraberry Change Denied

AUSTIN, Tex.—Spraberry operators may not produce oil through casing to save tubing, the Texas Railroad Commission ruled last week.

The commission rejected the application of Phillips Petroleum Co. for permission to produce Spraberry wells without tubing for a 6-month period. It termed the request "too broad in scope" and said such practice "might tend to cause avoidable waste."

The commission did approve, however, a Phillips request for permission to conduct production tests in wells without the use of tubing.

Phillips engineers had testified that the company would soon have 10 wells completed for which it had no tubing and that tests had indicated many wells in the Spraberry trend of West Texas would flow through 7-in. casing over an extended period without unsatisfactory results.

Spraberry Wells Bought

MIDLAND. — Texas-Alberta Oil Corp. has purchased 2,880 acres of oil and gas properties in the Spraberry trend in Midland and Glasscock for approximately $6,000,000.

The purchase involves 35 wells in Tex Harvey pool. The company plans to continue offset drilling until a total of 72 wells have been completed.

The company said total indicated net reserves as of May 1 in both of the field's producing formations were 17,683,250 bbl.

Texas-Alberta is a wholly owned subsidiary of New Continental Oil Co. of Canada, Ltd., which has interests in Leduc, Turner Valley and other Canadian fields.

Output Still Climbing

California operators set another production record, but they're still short of the 1,000,000-bbl. daily mark

D. H. Stormont

LOS ANGELES.—Slowly, but more or less steadily, California's daily oil production continues to creep toward the 1,000,000-bbl. mark.

Last month, according to figures compiled by the Conservation Committee, production reached 988,000 bbl. daily, 500 bbl. above the May average and highest in the state's history. Current production, estimated at about the same level, thus is approximately 20,000 bbl. higher than the average for July a year ago.

Where did this new production come from? And which of the California companies through increased drilling contributed most to the production gain?

Biggest contribution can be attributed to San Ardo field, now producing almost 25,000 bbl. daily whereas a year ago it was turning out only 5,000 bbl.

Other fields which added to the total largely are in the Los Angeles area, aside from the notable exception of Ventura Avenue. This famous field is up 10,000 bbl. to about 74,000 bbl. daily.

Continued development of Honor Rancho and Castaic Junction has raised the output of these two 1950 discoveries to about 8,000 bbl. daily, an increase of more than 6,000 bbl. The old Brea-Olinda and Long Beach fields and newer Sansinena each are producing about 2,500 bbl. more daily than in July 1951.

Contributing companies . . . From this brief summary of increases, those familiar with California fields can readily guess which companies contributed most of the gain. They were Shell Oil Co., The Texas Co., and Jergins Oil Co. (Monterey Oil Co. now operates former Jergins properties not sold to General Petroleum Corp.)

The drilling and producing record of California companies producing more than 10,000 bbl. daily for the first quarter of this year and of 1951 are given in the accompanying table. Based on monthly reports of the Conservation Committee, the table does not reflect a company's participation in unit operations nor the production of subsidiary companies.

As shown, Shell's daily production was up approximately 16,000 bbl. to 87,800 bbl. daily, placing the company firmly in second place. Bulk of its increased output came about through increased drilling programs in Ventura Avenue, Brea-Olinda, and South Mountain.

The Texas Co. and Jergins, jointly responsible for the San Ardo drilling splurge, each recorded increases of about 10,000 bbl. daily. Texaco, the state's most active wildcatter during the past year, also was busy at Honor Rancho to the extent of a 2,500-bbl. production gain.

Company-operated production of the state's "Big Seven" during the first quarter amounted to 43 per cent of California's daily output.

New Approach

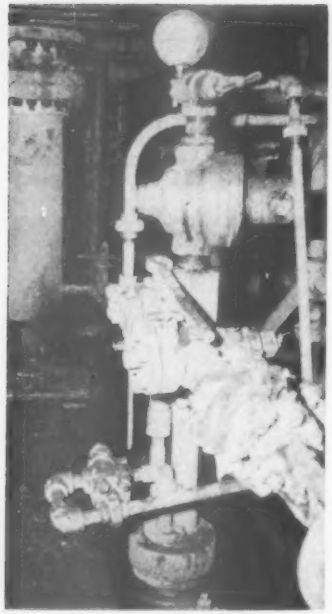
Union lays producing lines before drilling at Sansinena

LOS ANGELES.—Union Oil Co. is diverting from usual practice at a 10-well drill site on the eastern outskirts of Los Angeles. Producing lines already are in place awaiting the time when the yet-to-be drilled wells will go on production.

Located in Sansinena field at La Habra Heights, flow lines and power-oil lines for hydraulic free pumps were installed in the multiple-well cellar be-

PRODUCTION AND DRILLING RECORD OF CALIFORNIA COMPANIES

	1st. Q. 1952		1st. Q. 1951		1951		1950	
	Avg. prod. (bbl./day)	New wells comp.	Avg. prod. (bbl./day)	New wells comp.	Avg. prod. (bbl./day)	New wells comp.	Avg. prod. (bbl./day)	New wells comp.
Seven major companies:								
General Petroleum Corp.	33,800	13	37,900	8	36,200	33	34,900	25
Richfield Oil Corp.	63,900	9	59,400	26	62,800	91	57,000	140
Shell Oil Co.	87,800	37	71,200	19	77,400	89	65,900	33
Standard Oil Co. of California	96,800	56	101,000	53	99,600	194	98,400	166
The Texas Co.	27,000	48	18,700	8	21,100	114	17,300	23
Tide Water Associated	46,100	10	45,900	4	46,300	35	39,000	30
Union Oil Co.	63,700	24	62,600	12	63,300	89	53,200	36
Total	419,100	197	396,700	130	406,700	645	365,700	453
Per cent of California total	43	39	41	40	42	38	41	36
Others producing over 10,000 bbl. daily:								
Chanslor-Canfield	10,900	5	11,500	1	11,400	7	10,900	6
Continental Oil Co.	17,800	7	17,700	5	18,200	25	14,500	9
Jergins Oil Co.	17,700	52	6,700	1	11,100	60	5,200	3
City of Long Beach	60,900	21	63,600	28	63,900	131	42,100	82
Signal Oil & Gas Co.	20,200	5	20,800	6	20,500	22	20,700	23
Southwest Exploration Co.	29,700	7	31,300	9	30,700	27	26,500	40
Sunray Oil Corp.	19,400	7	21,200	2	20,800	17	21,200	18
Superior Oil Co.	9,700	4	10,800	2	11,100	17	11,800	7
Union Pacific	32,600	17	33,500	18	30,300	51	35,200	90
Total	218,900	125	217,100	72	218,000	357	188,100	278
Per cent of California total	22	25	23	22	22	21	21	22
Other companies	194,600	160	205,500	122	202,800	595	224,600	496
Per cent of California total	20	31	21	38	21	36	25	39
Unit Operations	142,200	27	141,400	1	143,900	79	119,200	44
Total California	974,800	509	960,700	325	971,400	1,676	897,600	1,271



CELLAR VIEW of the Sansinena drilling island where Union Oil Co. has installed flow and power-oil lines for 10 wells, 9 of which have yet to be completed.

fore drilling was started. One well now has been completed and placed on the pump and drilling of a second is in progress.

Ease of installation was the primary reason for the "cart-before-the-horse" procedure. As the remaining directionally drilled wells are completed over the next year it will be a simple process to connect the flow lines—simple, also, to place them on the pump. And as all of the holes are being slanted into proved areas, there is little question of their outcome.

Referred to as the world's quietest oil field, the fee-owned Sansinena property has been under development by Union for more than 3 years. At the first island 13 producers were completed, at the second location seven were drilled, and at the third site drilling is under way on the sixteenth of a 25-well group. Until drilling of the 10-well site was started earlier this year all work had been done by a single rig.

The company has been phenomenally successful in developing the Sensinena property without disturbing nearby residents. All drilling has been done with sound-proofed rigs, and all activity around the rigs kept as quiet as possible *(The Oil and Gas Journal, February 15, 1951, page 60)*. Similar procedures are being followed in producing operations.

CANADA

Tough Crude-Line Job

400 miles of mountains challenge contractors' ingenuity in laying Trans Mountain line from Alberta to Vancouver

VANCOUVER, B. C.—Construction of Trans Mountain Oil Pipe Line Co.'s 720-mile, big-inch trunk line from Alberta oil fields to the West Coast is presenting some of the knottiest problems ever to confront pipe liners on this continent.

Engineers must overcome especially tough installation and maintenance headaches along the 400-mile central stretch of mountain country. Here as many as 50 curves to the mile are unavoidable. Bends must be held to a minimum radius of 40 pipe diameters to accommodate the cleaning scaper. Hillsides are being avoided as far as possible to reduce earth pressure on the line and avoid damage from rock slides.

There are 21 navigable rivers which must be crossed.

Temperatures in the area range from 90° F. to far below zero. Coating, wrapping, and welding can be done only between June and October. Exterior work on the pump stations (there are five plus one booster) also must be done during the summer.

Line cover will range from 24 to 36 in., depending on regional temperature variations. Two factors, the extreme winter cold and the high wax content of some Alberta oils, require installation of scraper traps at 125-mile intervals.

Route . . . Beginning at Edmonton, the eastern terminus, the big trunk runs west to Jasper National Park in the Rockies, over the Continental Divide at 3,720 ft. in Yellowhead Pass, then follows the Canadian National Railway and the North Thompson River to Kamloops in south-central British Columbia.

At Kamloops it rises to cross a 4,000-ft. plateau to Merritt, follows the Canadian Pacific Railway through Coquihalla Canyon at 3,660 ft., then moves down to Hope at the head of the Fraser Rivey Valley, and through the valley to Burnaby, on tidewater outside Vancouver.

Only the 200 miles of foothills country west of Edmonton and down the last 80 miles of the Fraser River Valley to Vancouver is there comparatively easy going.

Progress . . . Canadian Bechtel, Ltd., designer and agent for Trans Mountain, and two contracting firms now have about 1,200 men on the job laying the first miles of 24-in. line in the hilly country of Central British Columbia. The contractors, Comstock Midwestern, Ltd., of Toronto, and Mannix, Ltd., of Calgary, Alta., are working three spreads.

Surveying and aerial photography were completed last year, and sites have been chosen for the pump stations. Clearing of right-of-way began in April, and shipments of pipe began to arrive at the same time.

Storage . . . Initial storage capacity will be 2,560,000 bbl. This will be raised eventually to 5,120,000 bbl. At present, eight 150,000-bbl. tanks are being installed at Edmonton, the same number at Vancouver, and two 80,000-bbl. tanks are going in at Kamloops.

Biggest and toughest of the river-crossing jobs will be the Fraser River operation at Port Mann, near the coast. Contract for this job has not been let. Pipe in all crossings will be ½-in. minimum wall thickness; that in the remainder of the line will be ¼ and 5/16-in.

Line Contracts Let

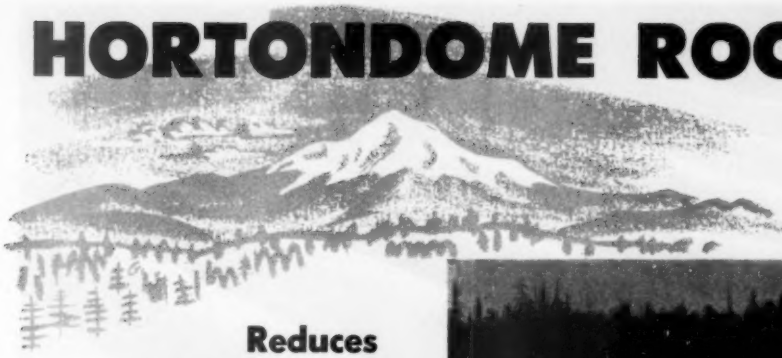
Williams Brothers, Mannix begin Trans-Northern work

TORONTO. — Trans-Northern Pipe Line Co. has let contracts for construction of its 440-mile, 10 and 8-in. products line from Montreal refineries to Ontario markets.

About 60 per cent of the line from its eastern terminus will be laid by a team composed of Williams Brothers Corp. and Mannix, Ltd. Contract for river crossings also is held by this joint organization. Contract for the remainder of construction is reported held by Sparling-Davis interests.

John Williams, president of Williams Brothers, said operations already are under way and about 35 miles of pipe has been laid. Field headquarters is at Gananoque. The line should be completed and in operation this fall, Williams said. All necessary pipe is not yet on hand, but no difficulty in obtaining it is anticipated. This is due principally to the fact that all pipe for

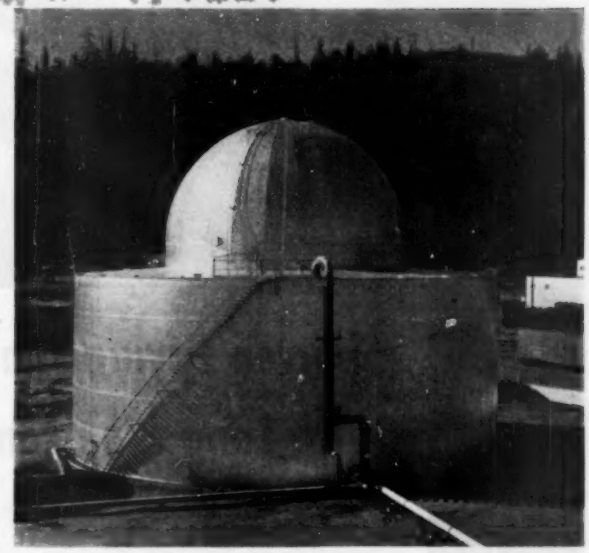
HORTONDOME ROOF

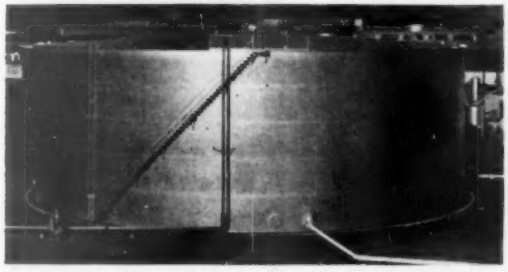


Reduces Vapor Loss in Pacific Northwest

The Pacific Northwest country is vigorous, beautiful, and a vast user of petroleum products. In 1914 the Shell Oil Company foresaw this huge western market and built their Willbridge Terminal at Portland, Oregon, to serve the Oregon, Washington, and Idaho territories. Today, over 350,000,000 gallons of petroleum products pass through Willbridge each year.

At the Willbridge Terminal a 100-ft. diam. by 40-ft. Hortondome Roof tank is helping provide the storage facilities so necessary to an operation of this type. The Hortondome Roof is designed to prevent evaporation losses from flat-bottom tanks used for standing storage. It provides a variable-vapor space which allows the air-vapor mixture above the liquid in the tank to expand and contract without being vented to the atmosphere.





Above right: 100-ft. diam. by 40-ft. Hortondome Roof tank. Above left: 120-ft. diam. by 40-ft. cone roof tank that is connected to the Hortondome.

Operation of the Hortondome Roof is simple. A flexible hemispherical membrane is attached, by its outer edge, to the equator of the Hortondome. As evaporation takes place or filling occurs, the membrane rises to make room for the increased vapor volume or vapor displaced by liquid. Air above the membrane is forced out through a vent at the top of the dome. When there is a contraction of air-vapor mixture or liquid is withdrawn, the flexible membrane descends.

For further information on the Hortondome roof, or any other Horton structure, write our nearest office.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 C & I Life Bldg.
Los Angeles, 17....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3....1615-1700 Walnut Street Bldg.
San Francisco, 4.....1544—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Sociedade Chibridge de Construcoes Ltda., Av. Franklin Roosevelt, 194-S/704-C, Rio de Janeiro, Brazil
Compagnie [illegible] 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland

Shorten Laying Time With Long Pipe Lengths

More and more oil and gas men are finding that the long lengths of Armco Welded Steel Pipe (up to 50 feet) help them get the job done faster and at less cost.

It means fewer sections to haul and handle so stringing moves fast. Assembly costs are slashed because there are fewer field joints.

But this is only one of the money-saving plus values of Armco Pipe. You match job requirements exactly to save metal and money. Diameters range from 6 to 36 inches and wall thicknesses from 9/64- to 1/2-inch.

What's more, Armco Pipe has uniform weldability and ample ductility for field laying by all standard methods to protect you against costly delays.

You will find Armco Welded Steel Pipe efficient and economical for pipe lines and gathering systems as well as plant piping. Write for complete data. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 1432 Curtis Street, Middletown, Ohio, 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation.

Export: The Armco International Corporation

Armco Welded Steel Pipe

ARMCO

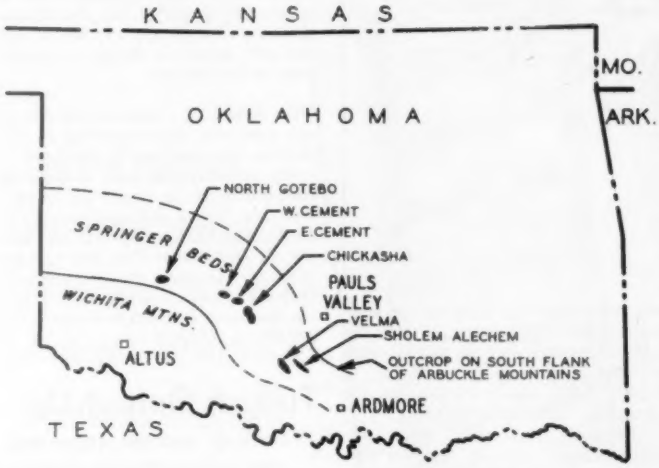
the project is coming from Canadian mills and delivery will not be affected by dwindling supplies of steel in the United States caused by the strike in progress there.

Route . . . The new line will connect Montreal East refineries, owned by McColl-Frontenac Oil Co., Shell Oil Co. of Canada, and British American Oil Co., Ltd., with Cornwall, Prescott, Maitland, Kingston, Belleville, Port Hope, Toronto, Clarkson, and Hamilton in Ontario. An 8-in. lateral, 44 miles long, will serve Ottawa from a main-line connection near Cornwall. Each of the above-named companies has a one-third interest in the project.

Pump stations initially will handle about 40,000 bbl. daily. Additional stations planned for the future will raise this to 60,000 bbl.

The line will carry as many as 19 different products, including aviation and automotive gasolines, kerosine, light and medium fuel oils, stove oil, diesel fuel, naphthas, solvents, propane, and jet fuel.

MID-CONTINENT



Springer Gas Sought

New drilling campaign in Anadarko basin developing as a result of discovery of large reserves in Oklahoma trend

Joseph A. Kornfeld

RECENT discovery of large gas reserves in the deep Springer sand has touched off a new drilling campaign in the Anadarko basin of southwestern Oklahoma.

Gas has been found in the Springer sand under the old Chickasha, East Cement, and West Cement fields, and at present seven heavy-duty rigs are drilling for the Springer along a 14-mile trend embracing these three areas.

The Springer sand, of Pennsylvanian age, has been found from Pauls Valley on the east almost to the Texas Panhandle along the front flank of the Wichita Mountains and extending into the basin.

Oil was discovered in the Springer at Velma field in 1944, and it has since been found productive at Sholem Alechem and other fields in the Ardmore basin. This spring Stanolind Oil & Gas Co. made an oil discovery in the Springer at North Gotebo, in Kiowa County, 65 miles northwest of the prolific Springer production in South-Central Oklahoma.

The recent gas discoveries have been on the flanks of older fields. The Springer sand was largely missing on the crests of these fields, and its discovery at greater depths on the flanks suggests that it may be productive over wide areas.

When it started . . . The deep Springer gas play started in the fall of 1951 when Little Nick Oil Co. drilled the 4 Glover on the northwest flank of Chickasha gas field.

It was drilled to about 15,000 ft. and then plugged back and completed at 9,500 ft. for an initial flow of gas estimated at 25,000,000 cu. ft. per day. Consolidated Gas Utilities Co. laid a line to the well and during December took as much as 8,000,000 cu. ft. a day from it.

Little Nick's discovery is believed to be on the northern edge of a Springer reservoir covering more than 7,280 acres, lying along the west flank of the old Chickasha field.

East Cement strike . . . Little Nick drillers then stepped over to East Cement, an oil and gas field about 5 miles to the northwest. The 6 Royce, the first deep try, brought in a big gas well at 6,193 ft.

No open-flow potential test has been conducted, but one gas company estimated that the potential is in the order of 100,000,000 cu. ft. per day. Consolidated has connected this well to its system.

Springer sands are thick in this area. Four sands logged in this well total more than 140 ft. of gross gas pay.

West Cement find . . . Seven miles west of East Cement field lies the West Cement area, which produces oil and gas from a series of lenticular Permian and Pennsylvanian sandstones draped over a sharp-folded anticline which trends from east to west.

Magnolia Petroleum Co. encountered a high-pressure gas sand at a depth of 8,900 ft. a few weeks ago at the 13 F. A. Niles. This well cratered, and crews killed the flow, set a whipstock, and sidetracked the hole. On last field report, crews were attempting to regain mud circulation, lost at a depth of about 9,100 ft. in the Springer series.

The widespread deposition of the Springer sand in the so-called "Trough Trend" in the southern extremity of the Anadarko basin has raised speculation that deep production might be found here and there throughout the entire area.

Other activity . . . Sinclair Oil & Gas Co. owns a large block of acreage overlying the deeper Springer sands on the west flank of Chickasha gas field; the outcome of another deep test now being drilled by Little Nick in that sector is being closely watched.

Deep South Oil Co. is drilling two deep Springer wells on the Cement townsite in East Cement field. These tests are a part of a six-well deal.

These fields have been producing gas since 1916. The Cement anticline was first prospected back in 1917 and the first gas well came in from Permian sands at only 1,415 ft. Chickasha gas field was discovered in 1922 at a depth of only 1,350 ft.

MIDDLE EAST

Rights Off Qatar Let

Royal Dutch-Shell becomes the first I.P.C. partner to go it alone in area by taking up former Superior concession

Dahl M. Duff

THE Royal Dutch-Shell organization has taken up the offshore concession around Qatar in the Persian Gulf which was relinquished by the Superior Oil Co. interests earlier this year.

Reports in the industry are that the concession contract was finalized in June between the shaikh of Qatar and Anglo-Saxon Petroleum Co., Ltd., one of the main operating companies of the Royal Dutch-Shell group.

The contract is especially interesting in that it marks the first time one of the partners in Iraq Petroleum Co., Ltd., has broken away to operate on its own in the Middle East since the now-famous Red Line agreement was dissolved in 1948, following the action of Standard Oil Co. (N. J.) and Socony-Vacuum Oil Co., Inc., in buying into Arabian American Oil Co.

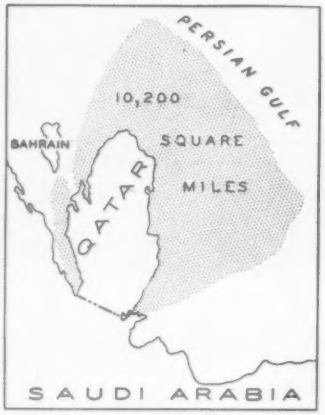
Concession terms . . . Terms of Shell concession on the underwater areas of Qatar are reported as follows:

The concession runs for 75 years. The company paid £260,000 (about $730,000) and agreed to start exploratory operations within 9 months. Drilling is to begin within 2 years, but this may be delayed for 2 more years with a penalty payment. Terms covering the exploitation or production phase of concession are left to later negotiation.

History . . . Superior obtained its concession in Qatar in 1949. Its minority partner was Central Mining Corp. of South Africa which has substantial interests in Trinidad Leaseholds, Ltd. International Marine Oil Co., Ltd., was incorporated in Canada August 5, 1949, and carried out gravity meter and seismograph work. The company also obtains offshore rights from the Trucial Coast shaikhdom of Abu Dhabi.

The Iraq Petroleum group held earlier concessions in both Qatar and Abu Dhabi, and arbitration proceedings under the terms of these concessions were held to determine whether all or what part of the offshore areas had been included in these earlier grants.

In 1950, a ruling was made that in general gave International Marine the sea bed beyond the limits of the territorial waters. This amounted to, in the case of Qatar, 10,200 square miles, all covered by fairly shallow water. A similar ruling was made later on the Abu Dhabi concession.



International Marine began geophysical work over its assigned area the latter part of 1950. It worked from headquarters in Manama, Bahrein. Last March, it became known the company was relinquishing the Qatar concession, and it is reported also to have turned back the rights it held from the shaikh of Abu Dhabi. Neither area had been tested by drilling.

Government Shaky

Mossadegh stays in, but ax is ready if he slips

PRIME MINISTER MOSSADEGH'S administration from all outward appearances is shakier than at any time since he assumed power in that country.

The Iranian parliament last week approved Mossadegh's reappointment to another term as leader, but the vote was so small in both the Senate and the Majlis that it amounted to a rejection of the prime minister's political and financial policies.

Members of both houses either abstained from voting or stayed away in droves. Only 76 seats in the 130-seat lower house of the parliament were filled. In the Senate only 14 members voted for the reappointment, while 19 abstained, 1 voted for the present minister of the interior, and 2 were void.

Both houses appear to be withholding action on Mossadegh until he presents a program for their approval. On the basis of last week's balloting, he would have a tough time getting a vote of confidence on his program in the future unless it is changed substantially from its present form.

These events were looked on as significant by oil-industry leaders since it is generally conceded that the Iranian nationalization dispute will not be settled until there is a change of government in the country.

More rumors . . . Reports that American companies are negotiating to buy oil from Iran continue to circulate.

The latest rumors have it that two unnamed American firms—one in Missouri and one in Colorado—are interested. Reportedly, they are not connected. The Denver Post said recently that two business men in Denver, Gerald B. Waldron and Richard S. Nelson, had made a deal to transport $183,000,000 in oil from Iran.

Turkish Output Up

Drilling success reported; new refinery being planned

TURKEY is producing about 600 tons (4,200 bbl.) of crude daily from eight wells, six in the Ramandag field and two in the Garzan area.

This was revealed by Nuri Ozsan, minister of labor and acting minister of industrial development, in reply to questions in the Turkish Parliament.

Seventeen wells have been drilled in the Ramandag area, and six of them are yielding 50 to 130 tons of oil daily. Two other wells are drilling.

In the Garzan area, two out of three wells drilled have proved productive and have a total output of about 130 tons daily. The area is near Mardin in the same part of southeastern Turkey as Ramandag.

Potential of these Turkish fields has consistently ranged considerably above actual output. If the figures announced in Istanbul reflect average production over a period of time, they indicate a much higher recent output level. In 1951, because of the remoteness of the fields, total production is believed to have been about 20,000 tons, or, rough-

KOCH has this *New Catalog* for you

the KOCH KASKADE
FRACTIONATING TRAYS
THE KOCH KASKADE fractionating tray is the most economical device yet developed for distillation, absorption or liquid-liquid extraction. The use of this high-capacity tray, which results in smaller and lighter weight towers, saves refineries and chemical plants 30% to 40% in the total cost of complete tower installations. In addition to increased capacity, over 200 world-wide installations have proved the Koch Kaskade tray has as much as 25% better efficiency than the conventional bubble tray. Maintenance of the Koch Kaskade tray has been found to be less expensive than the bubble tray. The Koch Kaskade tray is inherently more streamlined and has no stagnant areas in which foreign material can collect. Cleaning cycles have been lengthened as much as 750% by replacing bubble trays with Koch Kaskade trays.
HOW THE KOCH KASKADE TRAY FUNCTIONS . . .

Contains important and timely information on fractionating trays for distillation, absorption or liquid-liquid extraction.

It will pay you to investigate the increased efficiencies and capacities of Koch "Benturi"-type fractionating trays. Send for your copy of this new catalog.

USE THIS CONVENIENT COUPON

KOCH ENGINEERING COMPANY, INC.

DESIGNERS • MANUFACTURERS • BUILDERS

321 WEST DOUGLAS • WICHITA 2, KANSAS

Eastern and Export
30 Rockefeller Plaza
New York City

Pittsburgh, Pa., Repr.
D. D. Foster Co.
412 Peoples Gas Bldg.

Tulsa, Okla., Repr.
Myers-Bagwell Co.
Wright Bldg.

British Associates — Messrs. A. F. Craig & Co., Ltd. — Paisley, Scotland

KOCH ENGINEERING CO., INC.
321 WEST DOUGLAS AVE.
WICHITA 2, KANSAS

Gentlemen:

Please send us your Brochure No. 629 on the new Koch "Benturi"-type Kaskade tray.

Name _____

Company _____

Address _____

City _____ *State* _____

ly, 400 bbl. daily. Much of the oil is burned in railway locomotives, and some is processed locally in a 1,400 bbl. daily topping plant.

Refinery planned . . . The Turkish minister told parliament that the government had reached an agreement with a United States firm to build a refinery in the country. The plant is to be located at Batman, near Ramandag, and go into operation in mid-1954 with a capacity of about 270,000 tons, or about 5,400 bbl. daily. Products will include 35,000 tons a year of gasoline, 29,000 tons of gas oil, 10,000 tons of diesel oil, 37,500 tons of asphalt, and 130,000 tons of fuel oil. Ramandag produces 20°-gravity crude.

Other reports from Turkey say a state oil company is to be established in the near future to handle production, refining, and sales. It would have a capital of 300,000,000 Turkish pounds of which 55 per cent would be subscribed by the government.

At present, exploration and production are in the hands of the state-owned Mining, Research and Exploration Institute of Turkey (M.T.A.) In his statement in parliament, the minister said that drilling in the region of Kumbutelan had given promising results, and that test wells in progress at Iskenderun (Alexandretta) had confirmed the existence of oil.

Concession Aired

A.I.O.C. reports Kuwait terms extended 17 years

THE agreement reached late last year between the Government of Kuwait and Kuwait Oil Co., Ltd., extended the concession term by 17 years to the year 2026 and settled the seaward boundary of the concession area, which previously was in doubt.

These additional details of the Kuwait agreement were brought out in the annual report of Anglo-Iranian Oil Co., Ltd., half owner of the Kuwait concession with Gulf Oil Corp.

The A.I.O.C. report commented that the revised agreement, effective last November 30, follows "what is now the pattern generally accepted for oil-concession agreements in the Middle East."

In a general review of its operations, the company made plain the fact that the crude production lost as a result of the stoppage of shipments from Iran largely has been made up.

Not enough refineries . . . Refinery capacity, however, is still inadequate. "The increased supply of refined products from our own refineries and from processing arrangements made with other refiners cannot, however, meet our marketing requirements," the report said. "We shall continue to supplement our own supplies of products by purchases, where we can do so on satisfactory terms. . . ."

Discussing last December's sale of its two wholly owned subsidiaries in Iraq, the Khanaqin and Rafidain oil companies, to the Iraq Government, the report said that Khanaqin Oil Co. will operate the refinery and, until 1961, act as sole distribution agent. The Khanaqin company will continue its production and exploration activities in Northeast Iraq, and if sufficient oil is found for export, will share the profits equally with the Iraq Government.

A.I.O.C. now has a total of 155 ships of 1,950,000 dwt. in its fleet. Under construction or on order are 21 ships totaling 426,000 dwt. The company has on charter about 2,000,000 dwt. of tanker shipping, more than half of which is fixed for several years ahead.

EUROPE

Forecasters Set Back

Europe's big refining-capacity gains upset all estimates; even so, developments indicate need for more new facilities

THE sharply accelerated expansion of European refining capacity is outstripping all earlier estimates.

However, there is a question as to whether the modern new facilities now being built will produce too much gasoline and not enough fuel oil.

Oil officials in Europe are talking of a total European refining capacity of 1,700,000 bbl. daily by 1954. As late as last summer, the oil committee of the Organization for European Economic Cooperation estimated 1952-1953 capacity at about 1,300,000 bbl. daily.

About 3 years ago, the industry in the United States was concerned at overbuilding of European refineries and the 1949 goal of about 1,250,000 bbl. daily by 1952-53 was criticized as unjustified — particularly from the standpoint of Marshall Plan financing.

Fears unfounded . . . Developments since—the rapid rise of oil consumption in Europe and the urgent need for capacity to replace the 500,000 bbl. daily lost at Abadan—have indicated that the earlier goals were below, not above, what is necessary.

During the second half of 1951, refineries in the OEEC countries, that is, virtually all of non-Communist Western Europe, actually were running at a rate of about 1,300,000 bbl. daily under the stimulus of maximizing production in view of the Iranian loss. OEEC oil officials in Paris now are restudying European requirements over the next 4 or 5 years and preparing to revise the refinery-throughput estimates made in the report last summer.

Here are expected gains . . . Capacity increases unofficially expected between now and the end of 1953 in the leading European countries (in approximate barrels daily) are:

	Current	End of '53
United Kingdom	425,000	535,000
France	340,000	435,000
Italy	192,000	248,000
Belgium-Netherlands	160,000	214,000
West Germany	126,000	190,000

If these estimates are realized, the total throughput of the five leading Western European countries will reach about 1,620,000 bbl. daily by the beginning of 1954.

Refinery construction work is moving forward throughout Western Europe. There are several completely new plants, notably Jersey Standard's Belgian refinery, Condor and Sarpom in northern Italy, and Anglo-Iranian's Kent project in England but much of the work is in expansion of existing installations.

Upgrading emphasis . . . While basic plant capacities are being enlarged, there is considerable emphasis on quality improvement, or the upgrading of production to higher-priced lighter products. Construction of catalytic cracking units in European refineries is booming.

All this means a reduction in the heavy fuel-oil yield, which in European refineries is now about 37 per cent. Industrial expansion in Europe since the end of the war, coupled with recurrent coal shortages, has caused a particularly marked increase in the consumption of heavy fuel oil. Prewar, Europe used about 110,000 bbl. daily of this product. In 1951 consumption

was estimated at about 360,000 bbl. daily.

On the other hand, gasoline consumption has been held down by various devices and is only about 25 per cent greater than before the war. Restrictions by governments limit gasoline octane to 72, motor method.

Importance of fuel oil . . . On the subject of European fuel-oil consumption, Cornelius J. Dwyer, chief of the petroleum branch of the Mutual Security Administration, said recently that over the long run, fuel oil will have to provide the bulk of future increases in European requirements for industrial energy. He said he did not believe the labor problem in European coal mines could be solved as long as the full-employment policy to which all European governments are committed exists. European refineries, he said, will run 50 per cent or more fuel oil, and it will not be priced as a byproduct, tied by outdated tradition to the United States price.

Dwyers' predictions are, of course, based on the assumption that demand for fuel oil in Europe will be great enough to encourage its production even in view of the type of equipment going in in many European plants. Raising fuel oil to the status of a major product in its own right, despite coal competition, would call for a virtual revolution in refinery economics.

Some in the industry feel that whatever lack of balance now apparent in prospective refinery production will in the long run be taken care of by the basic flexibility of the equipment itself and by the continuing upward trend of demand. Whatever surplus of gasoline may now be indicated in Europe would be quickly taken care of if present restrictions on its use in the form of burdensome taxes were relaxed, or if automobiles became widely available.

Gasoline Stocks Build Up

What is described in Hamburg as sales difficulties has resulted in a heavy accumulation of gasoline stocks in West Germany and reduction of runs in some refineries.

The German Shell company was reported working at about 82 per cent of its annual capacity of 1,565,000 tons. Only 65 per cent of the capacity of its plant at Monheim, Bavaria, is in use. Esso, which is expanding to an anticipated capacity of about 1,400,000 tons a year by 1954, now is using its present 700,000-ton capacity to the full, and BP (Anglo-Iranian) is at about 98 per cent of the present 810,000-ton capacity.

West German refineries processed 389,714 tons (about 91,000 bbl. daily) of crude and semifinished products in April, compared to a monthly average for the first quarter of 415,700 tons. Crude processed in April included 133,737 tons of domestic and 252,487 tons of imported crude.

Albania to Start Refinery

Work is scheduled to start soon on a new refinery in Albania which is designed to cover the national requirements of the country, according to the Albanian Government.

The government's announcement confirmed other reports of the project *(The Oil and Gas Journal, June 16, page 183)* which gave the plant's location as Cerrik, southwest of Elbasan, and the capacity as about 3,000 bbl. daily. Most of the crude production of this small communist satellite country is now exported to Russia for refining.

Farben Interests Bought

Two West German companies, Wintershall, A. G., and Deutsche Erodel, A. G., have purchased the large interest in Deutsche Gasolin, A. G., formerly owned by the I. G. Farben trust.

The purchase followed a recommendation of the West German cabinet. An unidentified United States group earlier had been reported interested in buying the interest.

Deutsche Gasolin operates a refinery near Peine, in lower Saxony, and has extensive marketing facilities.

Joint Gas Company Formed

A joint Hungarian-Romanian company for the development and chemical processing of natural gas is to be organized under a long-term economic cooperation agreement reached between the two communist satellite countries, according to the official Hungarian news agency.

Gas from Romanian fields will be moved through a jointly constructed pipe line to Hungary where it will be chemically processed. The new agreement also provides for merger of the high-voltage power systems of the two countries.

LATIN AMERICA

Poza Rica Input Rate High

About 10,000,000 cu. m. of gas daily is being injected into the reservoir of Poza Rica field in Mexico in a pressure-maintenance undertaking, according to a statement made in Mexico City by Salvador Sanchez Martinez, Petroleos Mexicanos engineer.

The injection rate given is equivalent to about 353,000,000 cu. ft. daily. Poza Rica, discovered in 1930, has been producing more than half the country's entire oil output. This largest Mexican field is located in Veracruz and has an area of about 16,000 acres.

Sanchez Martinez also disclosed that the field's sulfur production continues at a level of about 120 tons daily.

AUSTRALIA

C.O.R. Financial Bill Pending

A bill providing for increasing the capital of Commonwealth Oil Refineries, Ltd., is to be presented by the government at the next session of the Australian Parliament.

The increased capital is needed for expansion of facilities required because C.O.R. will handle distribution of much of the production of the 60,000-bbl. daily refinery which Anglo-Iranian Oil Co., Ltd., is preparing to build near Fremantle in western Australia.

C.O.R. is owned by A.I.O.C. and the Australian Government. The Australian attorney general said there had been no delay in plans for the refinery because of the lack of action on C.O.R.'s capital increase.

International Briefs

Equipment for Mexico's new plant for the production of line pipe has been acquired in Italy, and the plant itself is expected to begin operation in the near future, according to Petroleos Mexicanos officials in Mexico City. The enterprise, Tubos de Aceros de Mexico, will have an initial production rate of about 50,000 tons of seamless pipe a year.

Juan Felipe 143, in the Cerro Azul field, has been brought in as a producer, Pemex officials have announced. The well was reported to be producing at a rate of 200 bbl. daily on a 6-mm. choke. Further drilling in the area is planned.

Esso A.G., German subsidiary of Standard Oil Co. (N. J.), has developed a new lubricant for use with two-stroke engines. The company said the lubricant prevents corrosion by use of a special additive and that it has the additional advantage of mixing completely with the fuel as soon as the engine is started.

PERSONALS

Eastern Leader

Jones' producing career began in Bradford field

JOHN PAUL (DICK) JONES, Bradford, Pa., the president of National Stripper Well Association, has been in the oil-producing business since 1924.

After graduation from the University of Pennsylvania, where he received a degree in economics, he entered the chemical industry. Later he became an oil producer in Bradford field.

He is a director and past president of the Bradford District Pennsylvania Oil Producers Association. He also is a director of production for the Pennsylvania Grade Crude Oil Association.

Other positions include that of representative for the Commonwealth of Pennsylvania on the Interstate Oil Compact Commission, member of the National Petroleum Council and of the executive committee of the Independent Petroleum Association of America. He also is vice chairman of the secondary-recovery committee of the Interstate Oil Compact Commission.

Jones also is active in local affairs. He has served Bradford as a member of the school board the past 12 years and was reelected last November for another term.

R. P. Hopson, Tulsa, has been elected vice president and assistant general manager of Texas-Empire Pipe Line Co. The board of directors also named **R. W. Phillips,** Tulsa, assistant general manager, and **D. B. Good,** chief engineer. Hopson, Phillips, and Good were given similar positions at a meeting of the board of Kaw Pipe Line Co.

Roy M. Owens, refinery engineering and construction specialist, has been named managing director of a new refining subsidiary Standard-Vacuum Oil Co. is forming in Australia. The subsidiary will operate facilities now undergoing expansion at an estimated cost of $30,000,000. Owens, who joined the company in 1935, has been serving as chief project engineer.

J. L. Irvin has been appointed general manager of pipe-line operations for the Gulf Oil companies in the United States and Canada. **Walter L. Shannon**

J. L. IRVIN

W. L. SHANNON

has been named to succeed Irvin as manager of the southern division of the pipe-line department. Both will continue to maintain their offices in Houston, headquarters for Gulf's pipe-line and crude-oil-purchasing departments.

H. Gordon Jones has joined Rice Engineering Co. at Chase, Kans., as field engineer. He formerly was with Mississippi State Board of Health.

John W. Hawkins, planning engineer for Service Pipe Line Co. at Tulsa, has been transferred to Lubbock, Tex., as district engineer in the company's West Texas division. Other changes announced by the company include: **John J. Wright, Jr.,** oil traffic engineer, promoted to area engineer at Lubbock; **Murray C. McNichol,** engineer in the Slaughter district, promoted to oil traffic engineer at Lubbock; **Homer Stephens,** division machinist at Carrollton, Mo., transferred to Topeka, Kans., and promoted to area master mechanic for the Nebraska division; **H. R. Puckett,** transferred from Topeka to Carrollton as area master mechanic for the Missouri division.

Don Dunbar, Jr., geologist for Union Oil Co., has been transferred from Midland to Amarillo, Tex., where he is in charge of the company's Panhandle office.

Robert Gebhart, formerly with Co-Operative Refining Association, has joined the geological staff of Anderson-Prichard Oil Corp. at Wichita.

Charles C. Clark has opened offices in Denver for Chester C. Clark & Sons, geological and engineering consultants in Shreveport, La. He formerly was a geologist for Carter Oil Co. and Texas Eastern Transmission Co.

Harold J. Holmquest, Jr., who has been on leave of absence from Magnolia Petroleum Co. to receive a master's degree in geology from Michigan State College, has returned to the company as a geologist at Abilene, Tex.

George H. Fentress, geologist for Lion Oil Co. at El Dorado, Ark., has been promoted to district geologist at Denver, Colo.

Andrew T. Wimmers, formerly shift foreman for Cities Service Oil Co. at Ponca City, Okla., has been appointed process engineer for Lago Oil & Transport Co. at Aruba, N.W.I.

J. L. Van Atten, field superintendent for Southern Minerals Corp. at Stratton Field, Tex., has been promoted to general production superintendent at Corpus Christi.

D. P. HEATH

Donald P. Heath has been appointed chief of the aviation-fuels branch of the refining division of the Petroleum Administration for Defense. He is on loan from the research and development laboratories of Socony-Vacuum Oil Co., Inc., at Paulsboro, N. J., where he was a research associate. At PAD he replaces **D. L. Neal,** who has returned to Phillips Petroleum Co., at Bartlesville, Okla. Heath previously was with PAD for a short period in 1950 and was a member of PAD's military fuels technical advisory committee.

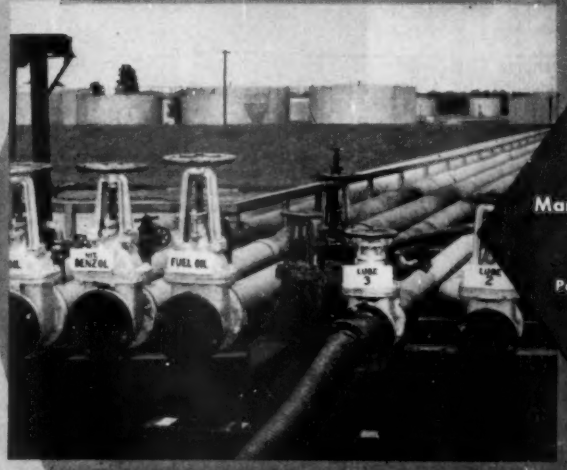
G. H. Samuels, Jr., geologist for Shell Oil Co. at Lake Charles, La., has been appointed division geologist at Baton Rouge. In his new assignment

clean
or dirty

clean
or dirty

clean
or dirty

clean
or dirty



5
TANK STORAGE TERMINALS . . .

Important Marketing Centers

Port of New York (Carteret, N. J.)

Port of New Orleans (Goodhope, La.)

Chicago

Houston

Corpus Christi

General American Tank Storage Terminals handle any chemical or bulk liquid . . . *clean or dirty* . . . that flows through a pipelined Storage facilities, pipelines and closely guarded manifolds (designed to protect against contamination) are yours to use. At Carteret and Goodhope terminals your bulk liquids can be blended to specification, canned, drummed or barrelled for distribution. *All this without investing or risking your capital!*

GENERAL AMERICAN TANK STORAGE TERMINALS
A Division of General American Transportation Corporation
135 South La Salle Street • Chicago 90, Illinois

TANK STORAGE TERMINALS GENERAL AMERICAN TRADE MARK

he will coordinate exploration activities in South Louisiana. Other company changes include: **J. K. Larsen,** appointed assistant division geologist at Baton Rouge; **L. J. Blakewood,** geophysicist at Lake Charles, transferred to New Orleans; and **J. Braunstein,** stratigrapher at Jackson, Miss., transferred to New Orleans.

Frank L. Fisher has been promoted to regional geologist for Ashland Oil & Refining Co., Ashland, Ky. **Wallace Hanson** has been named division geologist at Midland, and **John Thornton** has joined the company as district geologist at Wichita Falls, Tex.

Glen Marsh, Oklahoma City, assistant division superintendent for Cities Service Oil Co. (Del.) in North Texas and South Oklahoma, has been transferred to Bartlesville, Okla., as assistant

GLEN MARSH

HUGH L. RILEY

general superintendent. Replacing him at Oklahoma City is **Hugh L. Riley,** formerly district superintendent at Graham, Tex. **F. D. Priebe,** Odessa, Tex., has been promoted to district superintendent there, replacing **C. R. Smith,** recently transferred to Bartlesville as general superintendent of production. Assuming Priebe's former position as district engineer is **Donald L. Kastner,** district petroleum engineer at Russell, Kans. **William C. Newlin** has been transferred from Oil Hill, Kans., to Russell to replace Kastner. Other company changes include: **A. E. Straub,** Bartlesville, appointed assistant chief production engineer; **L. B. Hicks,** Bartlesville, named equipment engineer; **C. D. Zlomke,** Gladewater, Tex., assistant production foreman, transferred to Rock Springs, Wyo., to supervise production activities there; **Donald F. Presley,** Gladewater, appointed to Zlomke's former position; **Eugene F. Motter,** Madison, Kans., transferred to Gladewater as production engineer; **O. C. Atkinson,** Graham, special engineer, transferred to Vernal, Utah, and **G. L. Goodwin,** assistant production foreman at Lindsay, Okla., transferred to Lima, Mont.

Petroleum Equipment Suppliers Officers

New officers elected at the seventeenth annual meeting of the Petroleum Equipment Suppliers Association in San Francisco, June 22-25, are, left to right: Mason B. Jones, The S. M. Jones Co., Toledo, president; Dave S. Faulkner, recently retired from National Supply Co., director emeritus; Davis D. Bovaird, Bovaird Supply Co., Tulsa, vice president, and F. M. Mayer, Continental Supply Co., Dallas, retiring president.

M. S. Moore has been appointed a driller for Triple Drilling Co. at Seminole, Okla. He formerly was a driller for Phillip O'Neal at Duncan, Okla.

John A. Sutherland, senior engineer for Sunray Oil Corp., has been transferred from Benton, La., to Tulsa.

H. C. Petersen, head of the oil and gas division of Freeport Sulphur Co. at Houston, has been appointed a company vice president.

Col. Earl R. Chase has returned to the United States following a tour of duty as area petroleum officer for the Far East command and is now stationed at Fort Sam Houston, Tex., as post quartermaster. He was chief clerk of the producing department of Magnolia Petroleum Co. when called to active duty in 1940. He was active in the Canol pipe-line project in Canada and Alaska and later helped plan the European military products lines. He was assigned later as senior army representative on the Armed Services Petroleum Board in Washington.

Robert Hoch, engineer for Phillips Petroleum Co., has been transferred from Odessa, Tex., to Houston.

A. H. Menuet, Skelly Oil Co., Kansas City, has been named head of the technical and standards committee of the Liquefied Petroleum Gas Association. **George Benz,** Phillips Petroleum Co., has been appointed chairman of the transportation committee.

Carl E. Allen, Muskegon, Mich., has been elected to the board of directors of Dow Chemical Co. He is president of Campbell, Wyant & Cannon Foundry Co.

James W. Vater, Jr., has joined F. Kirk Johnson as district petroleum engineer for North Texas at Jacksboro. Vater formerly was employed in the drilling department of Kerr-McGee Oil Industries, Inc., and for the past 2 years has been petroleum engineer for Champlin Refining Co. at Enid, Okla.

Edna J. Elliott has resigned as geologist for Stanolind Oil & Gas Co. at Midland to open consulting offices there.

Donald D. Vaughan, independent consulting geologist, has moved his office from Wichita to Great Bend, Kans. He formerly was with Duke & Wood Drilling Co. and Bay Petroleum Corp.

Dr. H. A. Ambrose has been appointed director of the newly organized product division of the chemistry division of Gulf Research & Development Co. at Harmerville, Pa. **Dr. C. W. Montgomery** has been appointed director and **W. C. Offutt,** assistant director, of the new process division there.

PERSONALS

C. B. Humphrey, district land man in the Corpus Christi, Tex., office of Ralph Lowe, resigned July 1.

S. B. Ingerson, compound-plant general foreman for Phillips Petroleum Co. at Kansas City, Kans., has been appointed lube planning and development engineer for the company at Bartlesville, Okla.

R. D. Gordon, Jr., formerly division geologist for Ashland Oil & Refining Co., has been appointed division manager at Oklahoma City. **A. G. Burki,** division engineer, has been promoted to division production superintendent at Oklahoma City. **N. F. Mefford,** petroleum engineer in the Henderson, Ky., division, has been promoted to assistant division production superintendent.

Stewart S. Kurtz, Jr., has been appointed technical associate in the research and development department of Sun Oil Co. He will move to department headquarters in Marcus Hook, Pa., to become a staff assistant to **Dr. J. Bennett Hill,** director of the chemical and engineering division. Since 1942 Kurtz has served as manager of the company's chemical-research laboratory at Norwood, Pa. Kurtz will be succeeded at Norwood by **Dr. C. L. Thomas,** who was director of research and development for Great Lakes Carbon Corp. for 6 years before joining Sun last December.

N. E. Tanner, minister of mines in Alberta, Canada, has resigned to go into business for himself.

Dr. Robert E. Hulse, vice president of National Petro-Chemicals Corp., has been elected vice president of National Distillers Products Corp. National Petro-Chemicals, a partially-owned subsidiary of National Distillers, is constructing a plant at Tuscola, Ill., which will be one of the largest in the world devoted to recovery of ethane, propane, butane, isobutane, natural gasoline, and other hydrocarbons from natural gas.

J. B. Stewart, junior engineer for Shell Oil Co. at Los Angeles, has been promoted to exploitation engineer. **A. G. Cowan, Jr., J. J. Pickell,** and **D. C. Pontius** have been transferred from the engineering staff in Casper, Wyo., to Glendive, Mont. **A. C. Ellis,** driller at Brea, has been promoted to drilling foreman, and **R. J. Wilkerson,** Brea driller, has been promoted to drilling foreman and transferred to Bakersfield.

Estin Scearce, superintendent of the Jal, N. M., division of El Paso Natural Gas Co., has been named operations manager for the Permian division. Other company changes include: **W. H. Miller,** superintendent of main-line compressor stations, appointed operations manager in the southern division; **R. W. Harris,** superintendent of the San Juan division at Farmington, N. M., promoted to operations manager of the San Juan division and also placed in charge of the company's pipe-line construction program; and **J. F. Eichelmann,** company chief engineer, placed in charge of coordinating engineering matters in the engineering, operations, and construction departments.

ESTIN SCEARCE

W. H. MILLER

R. W. HARRIS

James D. Shipman, petroleum-engineering assistant for Magnolia Petroleum Co., has been transferred from Electra, Tex., to the Pegasus district. Other company transfers include: **Martin D. Rowe, Jr.,** petroleum engineer, from the Brownfield district to Kansas division offices in Wichita; **James G. Litherland, Jr.,** petroleum engineer, from West Texas division offices in Midland to the Dallas general offices, and assigned to reserves and evaluation section of the petroleum-engineering department; and **John L. Sanders,** from the drilling-tools department at Port Arthur to the petroleum-engineering department at Brownfield.

Al Siemens, geologist for several years with Pure Oil Co. at Oklahoma City, has been transferred to Wichita as district geologist. He replaces **V. E. Spradlin,** who is now a geologist for Skelly Oil Co. in Wichita.

J. E. Tyson, formerly district geologist and manager of the Houston office of Sunray Oil Corp., has joined Hurt Oil Co., Ltd., at Houston.

George W. Perry, junior engineer for Stanolind Oil & Gas Co., Tulsa, has been transferred to Oklahoma City.

B. A. Ogle, formerly supervisor of surface mapping in the Pacific Coast and Rocky Mountain areas for Shell Oil Co., has joined the staff of W. Ross Cabeen & Associates in North Hollywood. Before joining Shell he worked for Union Oil Co. and was a geology instructor at the University of California, Berkeley.

R. C. Schmidt, formerly associated with Loffland Brothers Drilling Co. in West Texas, has joined Carl B. King Drilling Co. of Midland as contract representative.

P. Van Thiel, geologist for Shell Oil Co., has been transferred from Pueblo to Wheatridge, Colo.

Gordon McNutt, formerly a member of the geological faculty at the University of Texas, has opened a consulting office in Austin. He will do exploration and valuation studies in the Gulf Coast and Rocky Mountain areas.

DEATHS

Harry A. Simon, 63, oil producer, died July 7 at Hominy, Okla.

Clarence A. Bennett, 79, former Sand Springs, Okla., driller, died in Sand Springs, July 1.

Paul H. Brace, 51, for 22 years an engineer for Petrolite Corp., died at his home in Mount Pleasant, Mich., June 30.

Robert John Kyle, 82, who retired in 1942 as an engineer for Associated Oil Co., died recently in Long Beach, Calif.

G. V. N. (Van) Yates, 70, former manager of the crude-oil supply and transportation division of Cities Service Oil Co. at Bartlesville, Okla., died July 7 of a heart attack. He joined Texas Pipe Line Co. in 1907 and was district superintendent from 1912 to 1921. He also was an independent oil man several years and was associated for a time with the old Lubrite Refining Co.

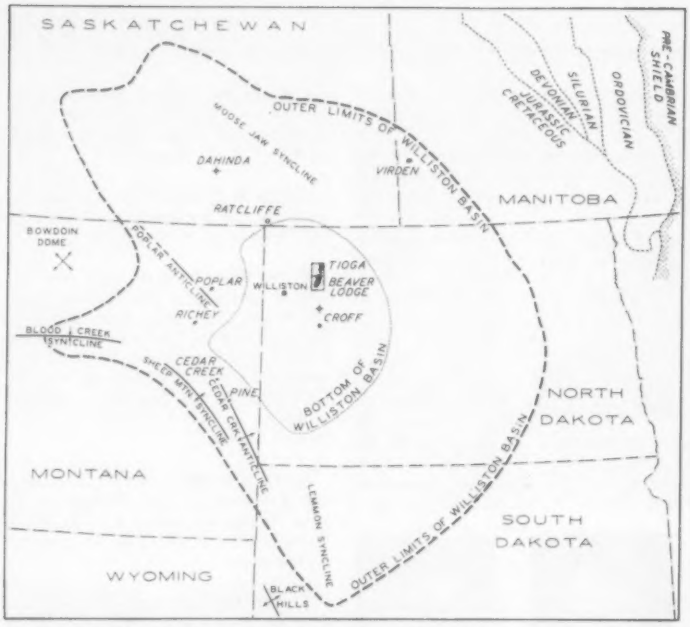


Fig. 1 (left)—Map showing limits of the Williston basin as used in this article, principal structural features, and producing areas. The "bottom of the basin" is that area where basement rocks are believed to be more than 12,500 ft. deep.

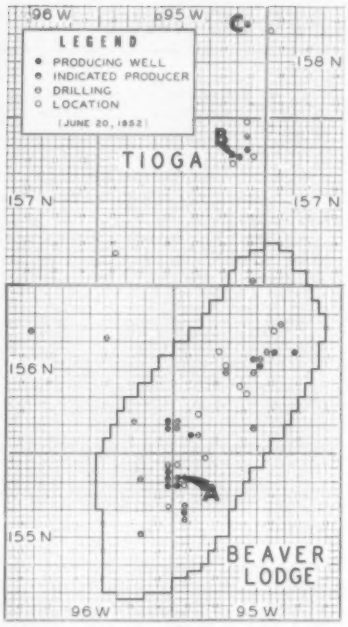


Fig. 2 (right)—Detail map of Beaver Lodge and Tioga areas. Outline of Beaver Lodge includes that portion of the Nesson anticline estimated to be the maximum area that might ultimately be productive—this outline was used at the North Dakota State Industrial Commission hearing on 80-acre spacing for Beaver Lodge.

WILLISTON BASIN . . .

. . . Today's most exciting oil province

by Philip C. Ingalls

Williston Today

BASIN AREA includes about 118,500 sq. miles (75,835,000 acres)—78,930 sq. miles in the United States and 39,550 sq. miles in Canada. Reserve guesses indicate at least 2½ billion barrels will be recovered from basin. Forecast of production gives about 200,000 bbl. daily at end of 10 years.

NORTH DAKOTA has 35,200 sq. miles in basin. Three producing areas being developed in Madison. They indicate 55-mile-long trend on big Nesson anticline. Biggest field, Beaver Lodge, has 12 producing wells with eventual number of Madison producers in field estimated at about 600.

MONTANA has four producing areas in the 24,900 sq. miles included in the basin. Production is from Mississippian, Devonian, and Ordovician rocks in northwest-southeast trend about 100 miles long.

SOUTH DAKOTA has no production. Three significant tests have been drilled within the 18,830 sq. miles of basin area.

SASKATCHEWAN has an indicated discovery in the Madison just north of the United States border. Basin area includes about 35,600 sq. miles.

MANITOBA's 3,950 sq. miles of basin area has one small field developing in Madison equivalent rocks.

RESULTS of the past year's wildcatting and development drilling in the Williston basin has made that northern area the most exciting oil province in the United States today.

Enthusiasm for the potentialities of the Williston basin has yet to reach its limit. This enthusiasm, generated by a few widely separated wildcats and a limited number of development wells, is growing constantly as more and more wildcats and significant extension tests are completed as oil wells.

There are now eight producing areas in the Williston basin. Seven are in the United States (three in North Dakota and four in Montana) and one in Canada (Manitoba). Recently a possibly commercial discovery was indicated in the Saskatchewan portion of the basin.

When current discoveries are fully evaluated it may be shown that between ¼ and ¾ billion barrels of oil already

has been discovered in the Williston basin. Even though the oil reserves opened by existing discoveries fall short of that plus or minus ½ billion barrels there can be little question but that a most important source of oil is being and will be developed in this relatively unexplored region.

Size of basin . . . An outline of the Williston basin as adopted by one major operator in the basin is shown on the map, Fig. 1. The outline follows the approximate location of the zero contour of the Dakota on the east and south. It skirts the Black Hills but includes the Baker-Glendive and Poplar anticlines and the Sheep Mountain and Blood Creek synclines. The outline swings around Montana's Bowdoin dome into the Moose Jaw syncline of Saskatchewan and then ties into the approximate location of the beveled edge of the Mississippian in southwestern Manitoba. (See page 97 for map of original limits of Williston basin.) Approximately 118,500 sq. miles (75,835,000 acres) are included in the modern outline. There are 35,200 sq. miles (22,525,000 acres) in North Dakota, 18,830 sq. miles (12,050,000 acres) in South Dakota, and 24,900 sq. miles (15,940,000 acres) in Montana to give the United States portion of the basin about 78,930 sq. miles (50,515,000 acres). The Canadian portion of the basin as outlined includes 39,550 sq. miles (25,310,000 acres).

The most prominent known structural features and the producing areas of the Williston basin area are also located on this map. The Nesson anticline is at the Croff-Beaver Lodge-Tioga area.

Nesson Anticline

The Nesson anticline in North Dakota is a surface-expressed structure about 30 miles long and 20 miles wide which rises out of the depths of the Williston basin. The northern end of the anticline is covered by glacial drift so that the feature cannot be mapped by surface geological studies. Ideas regarding the northern extent of the Nesson anticline, which have been developed from geophysical studies, have yet to be checked by drilling.

The Nesson auticline is believed to be accentuated at depth. Some believe that it may exist because of a deep-seated fault in the basement rocks such as indicated at the Baker-Glendive anticline to the west in Montana.

The fact that the Nesson anticline is reflected in surface beds is indication that it has been growing up into Tertiary-Eocene time. This growth is believed to have been initiated in Mississippian time or earlier. Some geologists believe that the Pennsylvanian and Permian beds pinch out between the Baker-Glendive and Nesson anticlines so that they do not cross the big North Dakota structure, but others believe that rocks of these ages are present on the Nesson structure. This difference of opinion stems from inadequately developed stratigraphic correlations (see "stratigraphy.")

It is on this tremendous structural feature that the most exploratory and development activity in the Williston basin is currently taking place. Amerada Petroleum Corp., with some 400,000 acres leased on the anticline is the principal operator. Amerada took all of this acreage following extensive geological and geophysical work carried out between 1946 and 1950.

The distance between the northernmost and southernmost oil wells on the Nesson anticline is now about 55 miles. Different water levels in the few clusters of wells so far developed indicate that oil has been reservoired in "bubbles" of various size superimposed on this big structure. Additional drilling might prove tilted water tables in some areas which would alter the present interpretations of oil-pool limits with a result that individual pools may prove bigger than now appears likely.

All wells on the Nesson anticline are producing from the Mississippian-Madison. Locating potential oil-producing zones is a problem that necessitates making production tests of intervals which would normally be passed up on the basis of drill-stem tests. It has been found that drill-stem tests are poor indicators of what a Madison or Devonian well might do after acidization.

The first deep test of the Nesson anticline was made by The California Co. in 1938, following seismic work. The well, carried to a depth of 10,281 ft., found shows of oil in the bottom 200 ft. of hole, but the hole was lost before adequate tests could be made.

Beaver Lodge . . . The first producing well on the Nesson anticline, the first in North Dakota, and the well that opened the Williston basin was Amerada 1 Clarence Iverson. (A on Fig. 2).

In April 1951 the 1 Iverson was completed flowing 406 bbl. of 53°-gravity oil and 3,100 M.c.f. of gas daily through ½-in. choke, after acidization, from the Devonian at 11,630-60 ft. The wildcat had been dug to a depth of 11,744 ft. Having recovered only 1 pt. of oil on drill-stem tests, this wildcat had been written off as another dry hole in North Dakota by most observers when the third production test made it the most significant discovery in the United States during 1951.

Because of high gas-oil ratio and a desire to determine what might lie at yet greater depth, this discovery was killed and the hole deepened to 11,955 ft. When mechanical difficulties were encountered the well was plugged back and in July was completed in the Devonian at 10,490-10,530 ft. From this shallower interval the well flowed 290 bbl. of 40°-gravity oil and 250 M.c.f. of gas daily through a ½-in. choke, after acidization. In December, following a test of flowing oil from the Madison at a wildcat about 12 miles to the north, the 1 Iverson was recompleted a second time to become the discovery well of the Beaver Lodge-Madison pool. This time the famous well flowed 671 bbl. of 43°-gravity oil and 820 M.c.f. of gas daily through a ¼-in. choke, after acid treatment, from the Madison at 8,520-28 ft.

Weekly Reports on Williston Basin

This article includes significant developments in the Williston basin up to about June 20, 1952.

In an oil province as young as the Williston basin, where any one of the 27 drilling wildcats might open an entirely new producing area, an article on developments is normally out of date before it is published. To supplement such articles as this, the Journal carries weekly reports on the more important developments under "Reports by areas" in the exploration and development section — see "Rocky Mountain" for Montana and the Dakotas and "Canadian Fields" for the Saskatchewan and Manitoban portions of the Williston basin.

" . . . by the end of 1953, crude available from Williston will be somewhere around 25,000 bbl. daily . . . 1963, 200,000 bbl. daily"

Beaver Lodge-Madison is the largest pool yet found on the Nesson anticline. Somewhere between 22,000 and 25,000 acres are expected to be productive in this pool. This is short of the original estimate of 36,500 acres (see Fig. 2) made on the basis of seismic studies, but it is still a most significant pool. Ultimate recovery for the pool is conservatively estimated at 200,000,000 bbl. on the basis of very inadequate reservoir data.

Wells in this pool are completed for about 500 bbl. of 45°-gravity crude daily on ¼-in. choke, after acidization. They are all completed in the Madison between 8,400 and 8,600 ft. The wells are drilled on 40-acre spacing pattern and are allocated 200 bbl. daily by field rules currently in effect. As shown on map of the field there were as of June 20, 12 producing wells, 2 wells that have indicated production, and 14 more drilling. Only one well has been found dry in the Madison and it is drilling deeper.

The Madison at Beaver Lodge is a limestone with pinpoint and vugular porosity. Fracturing has been found in some parts of the section. Permeabilities range from 1 to 100 md. and porosity from 5 to 15 per cent. Permissible gas-oil ratio is 2,000 cu. ft. of gas per barrel of oil. A gas-oil ratio of 1,100 to 1,300 to 1 exists in the Madison at Beaver Lodge. Initial bottom-hole pressure was about 3,640 psi.

Wells to the Madison which do not offset a producer cost about $210,000. Deep tests to the Devonian in the area will cost about $500,000. (See drilling story in this issue.)

Tioga area . . . It was at Amerada 1 Bakken (B on Fig. 2) that the Madison was discovered and the results of a drill-stem test in this wildcat led to the second recompletion of the 1 Iverson. The 1 Bakken was completed in April flowing 222 bbl. of 44°-gravity oil and a small amount of gas through a 12/64-in. choke after acidization from the Madison at 8,312-50 ft. This wildcat, the deepest stratigraphic test so far drilled on the Nesson anticline, encountered water in the Devonian but had shows of oil in the Ordovician.

The Tioga area is shown in detail in Fig. 2. It has two producing wells and an indicated discovery 5 miles to the north of 1 Bakken. Whether this well, Amerada 1 Skaar (C on Fig. 2) will prove to be an extension to Tioga, or to have opened a separate pool remains to be seen.

Croff area . . . About 35 miles south of Beaver Lodge is the Croff area where Amerada completed the 1 Risser flowing 83 bbl. of oil and 7 bbl. of water through a ¼-in. choke after acidization from the Madison at 9,515-70 ft.

About halfway between this discovery and Beaver Lodge pool is a well that is standing suspended after finding the Madison carrying too much water to make a commercial producer. This hole may be deepened to the Devonian at some future date.

Baker-Glendive Anticline

The Baker-Glendive or Cedar Creek anticline in Montana is a long, narrow structure extending in a nearly straight line for a distance of more than 115 miles in a northwest-southeast direction in the southeast corner of Montana (see Fig. 1). The structure is asymmetrical with the western flank much steeper than the eastern. The presence of the structure is believed to be due to deep-seated faulting on the west side.

Several shallow gas fields have been developed in a series of thin, lenticular, Upper Cretaceous sands on a series of low-relief domes on the Baker-Glendive anticline. The first gas field was found in 1915.

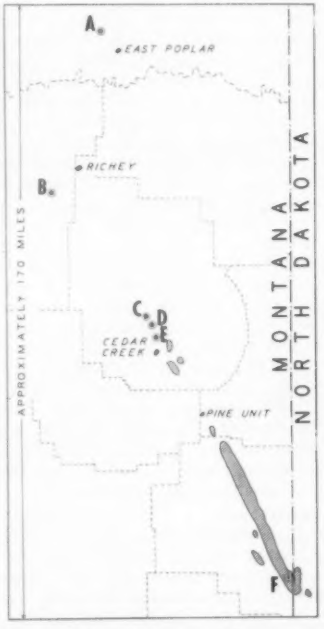


Fig. 3—Map of the eastern Montana portion of the Williston basin where production has been established on a 100-mile-long trend. Producing areas are shown by pool names. Circles are locations of wells that have had shows of oil which have or may indicate commercial possibilities.

Between 1936 and 1941 four deep tests were drilled on the anticline. Three of these tests, all of which were on the Little Beaver dome, recovered some black oil in the deeper Paleozoics, namely Mississippian and Ordovician: One of the wells flowed as much as 60 bbl. of 30°-gravity crude hourly before being flooded out by water. A total of about 28,000 bbl. of oil was produced from two of these wells prior to abandonment. The fourth test, drilled on the Baker dome about 25 miles to the northwest, was carried to a depth of 7,360 ft. without encountering commercial production.

Though the individual fields discovered on the Baker-Glendive anticline during the past year do not appear to be unusually large, they have yielded some big producers and have indicated a trend some 100 miles long.

Richey area . . . The first well to flow substantial quantities of oil in the Montana portion of the Williston basin was Shell Oil Co. 1 Northern Pacific Railroad. The discovery, indicated in July 1951, was initially completed last December for 1,656 bbl. of 38°-gravity oil and 408 bbl. of water through open tubing from the Mississippian-Charles (?) at 7,183-7,285 ft. to open Richey pool. (See Fig. 3.)

The Richey area is on a structural feature in alignment with the Baker-Glendive anticline. It is separated from the big anticline by a finger of the Blood Creek syncline as indicated on Fig. 1 by the bulge on the western limit of the outline of the bottom of the Williston basin. There are now eight drilling wells in this area, five are in the immediate vicinity of the discovery well, one is to the northeast about 3 miles, one is to the east about 7 miles, and one is to the southwest about 9 miles. This wildcat to the southwest (B on Fig. 3) recovered 225 ft. of slightly gas-cut mud with occasional drops of oil on a 2-hour drill-stem test.

One of the drilling wells has indicated commercial production. This Shell well, ½ mile northeast of the discovery, flowed oil on a drill-stem test at a rate of 1,260 bbl. daily with 740 bbl. of water. This confirmation test is the first Richey pool well to reach the producing zone of the discovery.

Cedar Creek area . . . About 20 miles north and west of Pine unit is The Texas Co. 1-B Northern Pacific Railroad, discovery well of Cedar Creek pool. This wildcat was completed last December for 254 bbl. of 38°-gravity oil from the Devonian or older rocks at 8,745-9,079 ft.

Shell recently completed a northwest

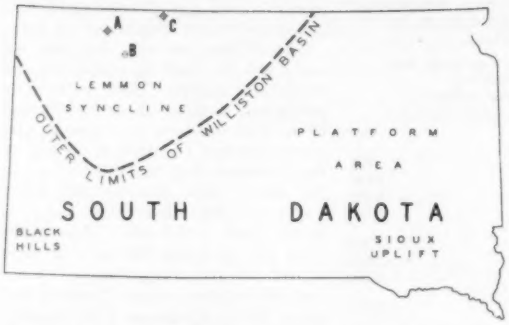


Fig. 4—Map of South Dakota showing portion included in the Williston basin, major structural features, and locations of three tests drilled in the deeper part of the syncline during the past year.

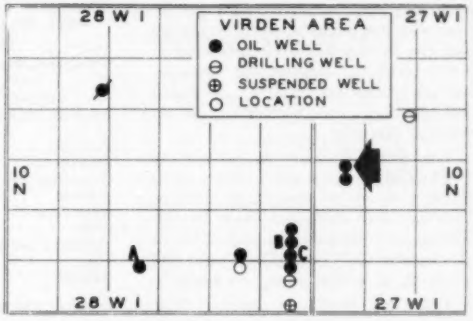


Fig. 5—Detail map of Manitoba's Virden oil field. It was here that the first free oil in producible quantities was found in the Williston basin.

offset to this discovery and reported it good for an aggregate estimated rated production of 6,700 bbl. of oil daily from five zones in a 414-ft. section of Devonian and older rocks. This well flowed oil at the rate of 3,500 bbl. per day through ¾-in. choke from the zone at 8,968-9,077 ft. following a 5,000-gal. acid treatment.

Pine area . . . The southernmost oil pool so far discovered on the Baker-Glendive anticline is Shell Oil Co. 1 Pine unit. This discovery, indicated last October and completed in February of this year, pumped 467 bbl. of 33°-gravity oil and 148 bbl. of water and mud daily from Siluro-Devonian or older rocks perforated at 8,910-30 and 8,940-70 ft. Shell is now drilling two additional wells in the Pine unit.

Other tests . . . Two other important wildcat tests on the Baker-Glendive anticline have had shows of oil.

Shell 1 Little Beaver (F on Fig. 3) is the southernmost wildcat to be drilled on the long structure in the current play. It lies about 50 miles south and east of Shell's Pine unit discovery. On a 2-hour drill-stem test at 8,380-8,423 ft. the wildcat recovered 325 ft. of oil, gassy mud and on a test at 8,379-8,423 ft. recovered 305 ft. of oily, gassy mud with spots of oil (about 1 per cent). These shows are believed to be from Siluro-Ordovician rocks. Shell is reported drilling ahead with plans to set casing on this important wildcat.

A Texas Co. well (C on Fig. 3) about 11 miles northwest of the same company's Cedar Creek discovery, has tested apparently commercial quantities of free oil, probably from the Charles or Madison. Two wildcats (D and E on Fig. 3) between this indicated discovery and the discovery well of Cedar Creek have encountered shows of possible commercial significance in Siluro-Devonian rocks.

Poplar Anticline

The Poplar anticline is a long, narrow, southeast-northwest trending anticline en echelon northeast of the Baker-Glendive anticline. (See Fig. 1.) It is the most important known structure east of the Bowdoin dome in Montana and west of the Nesson anticline in North Dakota.

Poplar area . . . C. H. Murphy, Jr., 1 East Poplar unit was the discovery well of this area on the Poplar anticline. The discovery was indicated in October 1951 and completed in March of this year from two intervals, one at 5,648-80 ft. and one at 5,799-5,814 ft., to become the first dual completion in the Williston basin. The discovery flowed 233 bbl. of oil daily from the Charles through casing and 335 bbl. of oil daily from the Madison through tubing.

Murphy's second well, about 4 miles southeast of the discovery, was completed dry at 6,286 ft. The Murphy 3 East Poplar unit, ½ mile east of the discovery, is testing oil at a rate of 450 bbl. daily.

About 8 miles northwest of Murphy's discovery is Ajax Oil Co. 1 McGowan (A on Fig. 3) in the West Poplar area of Roosevelt County. This wildcat flowed 15-20 bbl. of oil per hour from the interval 6,164-89 ft. from the Charles (?) which was topped at 5,778 ft. The oil flow was accompanied by gas at the rate of 1½ M.M.c.f. daily. Later the well began flowing water and is now testing.

The second oil well to be completed in Poplar area was C. C. Thomas 1 Huber. The well is slightly over 1 mile southwest of the Murphy discovery. Thomas' well was completed for 45 bbl. of 40°-gravity oil per hour from three perforated intervals between 5,500 and 5,638 ft. in the Charles (?). This well is now shut in for storage.

South Dakota

There have been only three wildcats dug within the limits of the South Dakota portion of the Williston basin since Amerada's discovery was made on the Nesson anticline in North Dakota. Two of these wells have been completed dry after drilling to basement and the third, now drilling, is approaching basement.

Lemmon syncline . . . That portion of the Williston basin in South Dakota is known as the Lemmon syncline. This north-plunging syncline lies between the Black Hills uplift and the eastern platform area. (See Fig. 4.)

The Black Hills uplift is a deeply eroded core of pre-Cambrian granite surrounded by concentric outcrops of Paleozoic and Mesozoic rocks. The eastern platform is a shelf area on which all pre-Cretaceous beds are missing and where Cretaceous rocks rest on basement as the Sioux uplift is approached.

The maximum Mesozoic and Paleozoic section in South Dakota is found in the northwestern part of the state at the deep end of the Lemmon syncline. Some 9,000 ft. of sedimentary rocks are known in this area.

Recent tests . . . Shell 1 Homme (A on Fig. 4) Perkins County, was the first well to be drilled in the deepest part of the Lemmon syncline. It was completed dry in December 1951. This was carried 18 ft. into basement, topped at 9,330 ft. Small gas shows were reported in this wildcat but there was no commercial recovery on drill-stem tests.

Shell's second South Dakota test was 1 Winter (C on map), Corson County. This wildcat was drilled to 8,445 ft., 2 ft. into basement rocks. A drill-stem test of the Madison at 5,578-5,610 ft.,

open 160 minutes, recovered 3 gal. of mud with pin points of live oil. Casing was run in this well and perforated at 5,585-5,615 ft. opposite the Madison but no production could be developed and the well was completed dry in April of this year.

The third Williston basin well in South Dakota is now drilling. It is Shell 1 Veal (B on map), Perkins County. Two drill-stem tests on this wildcat at 5,360-5,418 ft. and 5,949-73 ft. recovered 5,060 ft. of salt water and 4,880 ft. of sulfur water, respectively.

There are several en echelon folds known in the southwest corner of Harding County (northwestern corner of state) south of the Baker-Glendive anticline of southeastern Montana. During the forties several of these structures were tested. Mississippian and Ordovician rocks were found but no Devonian was encountered, which means that a Devonian pinchout exists somewhere to the north and northeast. One deep test of the Camp Crook anticline had a showing of oil at 7,820 ft.

Saskatchewan

There are about 35,600 sq. miles included in the Saskatchewan portion of the Williston basin as outlined.

During early September 1951, Shell 1 Dahinda, a wildcat 48 miles north of the United States border (see Fig. 1), bailed 20°-gravity crude at a rate of about 25 bbl. daily from the Mississippian at 4,694-4,704 ft., but commercial production could not be developed. This hole was checked by 32 drill-stem tests while drilling to a depth of 6,850 ft.

That was the first positive indication that commercial production might be developed in the Saskatchewan portion of the Williston basin since the early forties when Imperial Oil, Ltd., encountered a slight amount of free oil with a great deal of water on an unsatisfactory test of the Mississippian at a wildcat about 35 miles southeast of Shell's Dahinda.

Recently there has been another indication that Saskatchewan may soon have commercial oil production in the Williston basin. A Socony-Vacuum Exploration Co. and Central Leduc Del Rio Producers, Ltd., 1 Ratcliffe wildcat, just 4 miles north of the United States border and almost directly north of the North Dakota-Montana line, recovered 110 ft. of heavily oil-cut mud from rocks of Mississippian age on a 30-minute drill-stem test at 6,360-86 ft. Another drill-stem test at 6,424-36 ft. recovered 5 ft. of free 35°-gravity oil. The wildcat is now coring below 6,450 ft.

FORMATION TOPS FOR DISCOVERY WELL OF VIRDEN OIL FIELD, MANITOBA

California-Standard Co. 15-18 Daly (15, 18-10-27w1)
Ground elevation: 1,608.2 ft.
Kelly bushing elevation: 1,620 ft.

	Feet
Cretaceous:	
First specks	890
Second specks	1,160
Ashville	1,380
Swan River	1,540
Jurassic:	
Sandstone and shale	1,595
Lime	2,120
Anhydrite	2,180
Red Beds (Amaranth)	Absent
Mississippian:	
Charles (?)	2,190
Madison equivalent	2,224
Exshaw	2,505
Devonian:	
Lyleton shale	2,510
Jefferson equivalent	2,595
Red beds	3,730
Salt	3,770
Winnipegosan dolomite	4,132
Ashern	4,175
Silurian (Interlake)	4,240
Sand grains	4,505 and 4,555
Ordovician:	
Stony Mountain	4,580
Shale member	4,680
Red River	4,745
Winnipeg	5,210
Pre-Cambrian	5,359
Total depth	5,368

This potential discovery lies 65 miles northwest of Beaver Lodge pool and 80 miles northeast of Murphy's Poplar area discovery in Montana.

Manitoba

It was in southwestern Manitoba that the first free oil in producible quantities was found in the Williston basin.

On January 20, 1951, California-Standard Co. 15-18 Daly swabbed 3 bbl. of fluid per hour, 70 per cent oil and 30 per cent water. The oil had a gravity in excess of 30°.

This discovery well was drilled to a depth of 5,368 ft. Basement rocks were topped at 5,359 ft. (See log of formation tops.) After testing up the hole to a plug-back depth of 2,340 ft., 140 ft. below the casing shoe, the Mississippian-Madison equivalent was acidized prior to the swabbing tests which yielded the oil.

This marginal producer was put on pump, but within a month production had fallen off to about 15 bbl. of oil and a like amount of water daily. Pumping was suspended last October for the winter after the well had produced only 850 bbl. of oil.

Virden area . . . The field discovered by California-Standard 15-18 Daly (arrowed on map, Fig. 5) was named Virden after a town 9 miles to the east.

The Virden area now has nine oil wells, two of which have been shut in for several months. These wells have produced a total of about 20,000 bbl. of oil from Madison equivalent. California-Standard 2-12 Daly (C on Fig. 5) had produced about 8,850 bbl. of oil at the end of April and the same company's 7-12 Daly (B on map) had produced about 5,625 bbl. These wells were put on pump last year in September and July, respectively.

It was in this area that Canadian Superior Oil of California, Ltd., recently completed its first oil well in Manitoba. This well, 14-4 Cruickshank (A on map), produced 80 bbl. of 34°-gravity oil during the initial 3 days of testing on pump. Unlike most of the production in the Virden area the oil from this extension well was cut less than 1 per cent with water. Production is from the interval 2,515-30 ft., probably Madison equivalent.

Prospects . . . The Virden area has not indicated very prolific production to date, but when developments in other parts of the Williston basin to the west and southwest are considered, the significance of Virden in the over-all picture is indeed interesting.

Oil in Manitoba will probably be restricted to the southwestern portion of the province, downdip from the outcropping rocks just to the west of the Canadian shield. As shown on the map in Fig. 1, Ordovician, Silurian, Devonian, Jurassic, and Cretaceous formations outcrop in southwestern Manitoba. The Mississippian rocks are present, but are overlapped by a mantle of Cretaceous rocks before reaching the outcrop area. Virden field is probably very near the beveled edge of the Mississippian.

The outcrops of Mississippian, Devonian, and Silurian limestones suggest organic reefs by their fossiliferous character and porosity; however, porous zones cut in wells drilled in southwestern Manitoba have been characterized by strong flows of water where encountered to date.

The best hope for developing significant production in southwestern Manitoba appears to lie in locating wedgeouts beneath the Cretaceous sands and shales. The possibility of finding anticlinal traps in this apparently but slightly deformed area is considered remote.

Stratigraphy

The stratigraphy of the Williston basin has yet to be worked out for

(Continued on page 118)

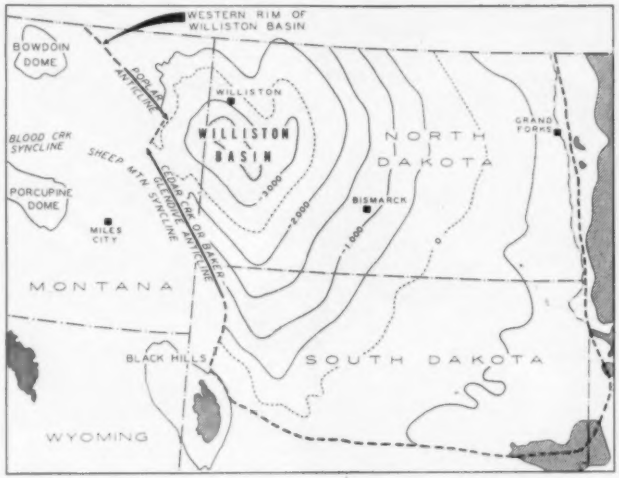


Fig. 1—Map of the United States' portion of the Williston basin. Heavy dashed line shows the original limits as established by W. T. Thom, Jr., and C. E. Dobbin (see Thom's letter).

How the Basin Got Its Name . . .

. . . a letter from W. T. Thom, Jr.

Chairman, Department of Geological Engineering, Princeton University.

Geology Department
Princeton University
June 16, 1952

In response to your inquiry as to how the Williston basin received its name, the answers, I believe, historically run as follows:

The name was actually coined by Dr. Carroll E. Dobbin (of the United States Geological Survey) and myself during 1922, as the result of regional studies made for the U.S.G.S. in Montana and the Dakotas. The name "Williston basin" first appeared in print in February 1923 on a map which was published by the American Association of Petroleum Geologists in connection with an article I wrote on "The Relation of Deep-Seated Faults to the Surface Structural Features of Central Montana." The first formal use of the expression "Williston basin" was in a scientific paper which Dr. Dobbin and I presented before the Geological Society of America on December 28, 1923. This article was later published by the G.S.A. on September 30, 1924—the regional map accompanying it being a copy of the one which had previously been published by A.A.P.G.

The actual existence of the basin had been demonstrated by a contour map showing the structure of the Cat Creek or Dakota sandstone in the Montana plains and western Dakota, which Dr. Dobbin and I compiled in 1921 and 1922. According to this map, later published by the U.S.G.S. (as extended and revised by Dobbin and Erdmann), the western rim of the Williston basin was marked by the steep western flank of the Baker-Glendive anticline and by the steep eastern flank of the Poplar anticline, this rim separating the basin on the east from the Sheep Mountain and Blood Creek synclines on the west.

The oil and gas possibilities of the Williston basin were discussed by me in U.S.G.S. memorandum for the press (No. 3761), which bore the caption "Possible Oil and Gas in North Dakota" and which carried the release date of June 13, 1923. This press notice said in part:

"The great structural depression centering near Williston has two major axes, one extending northwest and one east-northeast. Between these axes, northeast of their intersection, a broad upwarp in the Dakota sandstone extends from the vicinity of Westhope southwestward toward Williston.

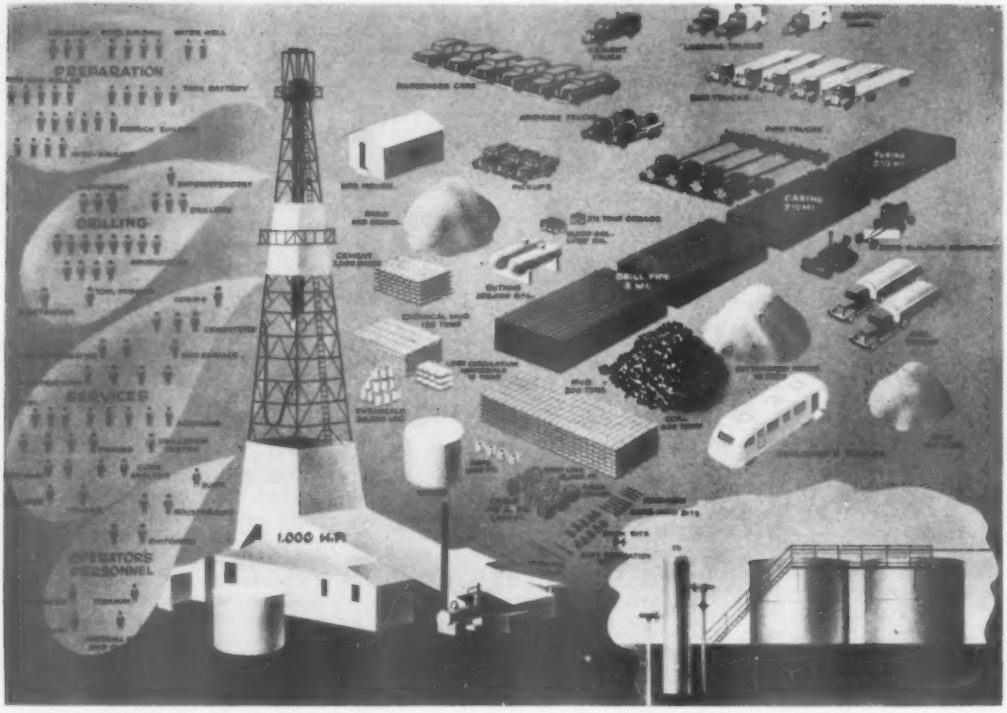
"It is possible that at some points in northwestern North Dakota the Dakota sandstone may lie unconformably upon petroliferous Paleozoic formations, as it does in some areas of western Canada. As the area northeast of the trough (center) of the Williston basin is one of ascending artesian circulation it is also more favorable for the anticlinal concentration of gas and probably of oil than an area in which water flows down the dip.

"In view of the facts stated, Mr. Thom believes that northwestern North Dakota, through strictly 'wildcat territory,' may contain pools of oil and gas, and that the area included in the Nesson anticline is the most favorable one to be tested first to determine whether such pools exist in the region. . . . If possible, arrangements should be made to drill through the Dakota and Lakota sandstones to determine the age and character of the underlying formations."

I believe the foregoing facts suffice to show why and how the Williston basin received its name; what western limits were set for the basin, as the name was first applied; and why this region was thought to provide favorable territory for oil and gas exploration.

Williston, N. D.

The city of Williston, county seat of Williams County, N. D., is located some 30 miles southwest of the first oil-producing area in North Dakota. This fast-growing city, population 7,378 (1950 census), is situated on the north bank of the Missouri River. Williston is served by the Great Northern Railroad and U. S. Highway 2. Principal source of income in the area has been agriculture.



MEN AND MATERIALS required to drill 1 Clarence Iverson, discovery well of Beaver Lodge oil field of North Dakota are shown in the chart.

Big Drilling Campaign in Prospect

Fifty-one rigs are currently strung out in Williston basin along a three-state front from the Black Hills to the Canadian border

by Joseph A. Kornfeld
Mid-Continent District Editor

FIFTY-ONE drilling rigs are active throughout the Williston basin in one of the principal drilling campaigns of the nation. These rigs are strung out along a front extending from the Black Hills of South Dakota across North Dakota into eastern Montana to the international boundary.

Exploratory Drilling

Eastern Montana claims the lion's share of exploratory drilling at this time in the Williston basin. Twenty rigs are active in Carter, Custer, Dawson, Fallon, McCone, Prairie, Richland, Roosevelt, and Wibaux counties. In a single county, Dawson, nine rigs are engaged in exploratory operations.

North Dakota has 10 active rigs seeking new fields. Five of these are in Williams County near recent discoveries; the others are scattered throughout McKenzie, Bottineau, Rolette, and Ward counties. Amerada Petroleum Corp. recently staked nine new locations, five at Beaver Lodge field and four at Tioga field. Shell Oil Co. is starting its third exploratory test in Perkins County, South Dakota. No commercial oil production has been found to date in South Dakota.

Development Drilling

Major share of the 21 developmental rigs active in the Williston basin are clustered in Williams County, North Dakota; this is where Beaver Lodge and Tioga oil fields were discovered last year.

In eastern Montana, seven rigs are active developing the East Poplar, West Poplar, Richey, Cedar Creek, and Pine unit fields discovered since last summer. These are working in Dawson, McCone, and Roosevelt counties.

Day Work

On the North Dakota side of the Williston basin, all of the drilling contracts are written on a day work basis. Current prices are reported at from $900 to $925 per day with the company paying drill-pipe rentals. The high amount of coring and drill-stem testing precludes straight-footage contracts.

Coring and reaming time including trip time ranging as high as 43.5 per cent on the discovery well in the Richey area of Dawson County. Likewise, the discovery well in the Pine

unit on the Cedar Creek anticline in Wibaux County consumed 38.9 per cent of total time in coring and reaming operations. Drill-stem testing consumed 8.0 per cent of total time in the former well and 5.6 per cent on the latter well.

Montana Fields

Drilling contractors active on the Montana side of the Williston basin include: Brinkerhoff Drilling Co., Casper, Wyo.; Cook Drilling Co., Riverton, Wyo.; Hewit-Gulick Drilling Co., Casper, Wyo.; Helmerich & Payne, Inc., Tulsa; Will I. Lewis Drilling Co., Denver; Loffland Brothers, Tulsa; McConnell Drilling Co., Bismarck, N. D.; Pennant Drilling Co., Denver; Pioneer Drilling Co., Inc., Casper; J. D. Sprecher, Casper; Taylor Drilling Co., Lewistown, Mont.; and Wagner Drilling Co., Sterling, Colo. Others are rapidly entering the area.

Drilling Rigs

Standard 10,000-ft. rigs are used in development in the Glendive, Cedar Creek, and Pine unit areas of eastern Montana.

Pioneer Drilling Co., which drilled in the Glendive area of Dawson County, Montana, for Shell Oil Co. at 34-26-G, NW SW SE 26-15n-54e, uses a 129-ft. portable with 10-ft. substructure. A model 800 draw works is powered by three LIR diesel engines. Two 7¾ by 16-in. mud pumps are used. Rotary table opening is 20½ in.

Helmerich & Payne recently moved in a Model 76 rig to drill the South Poplar prospect for Deep Rock Oil Corp. The contractor uses a 142-ft. jackknife mast. Prime mover is three LRO twin diesels driving one 7¼ by 18-in. and one 7¾ by 16-in. mud pump.

Drilling masts . . . Drilling masts are popular in the Williston basin. On the North Dakota side, the 133 and 142-ft. jackknife types are popular, while the 131-ft. type is employed in the deeper areas of eastern Montana.

Stepdown arrangements . . .Several applications of the stepdown arrangement of the substructure which mounts draw works and engines on different levels are featured in the Williston basin.

One application of the split substructure uses a 13-ft. substructure for the working area while the 8-ft. substructure mounts the draw works and engines. One of the earliest rigs to use this arrangement which permits the driller to see the rotary table and the cellar at the same time was described in the September 20, 1951, issue of The Oil and Gas Journal, page 234. Another variation, employed by Will I. Lewis Drilling Co., mounts the 131-ft. on the 9-ft. high substructure. Draw works, engines, and mud pumps are placed on the 5-ft. portion.

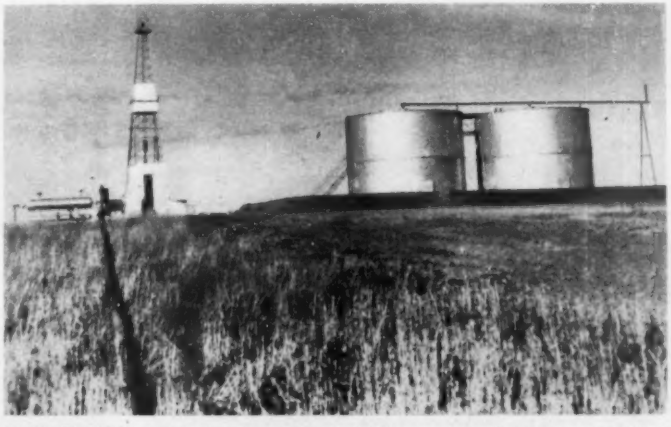
Another new stepdown rig arrangement is employed by Brinkerhoff Drilling Co. using a 133-ft., 700,000-lb.-capacity mast. The J-750 draw works is set on the derrick floor which is on a 10-ft. substructure. The engine foundations and part of the transmission are mounted with 18-in. skid beams on a 3-ft. 10-in.-high substructure.

WINTERIZED RIG arrangement of a typical drilling rig in the new Beaver Lodge oil field in the heart of the Williston basin.

Single-level substructures . . . Where draw works, engines, and compounds are mounted on a single level, substructures of from 9 to 10 ft. in height are employed.

Drilling Performance

Surface string . . . A 12¼-in. surface hole is cut to 800 to 1,200 ft., depending on the area, in eastern Montana. Then the hole is reamed to 17½ in. before setting surface. The surface



TANK BATTERY and horizontal separator installations at Amerada I Henry O. Bakken, C SW NW 12-157n-95w, discovery well of Tioga field, North Dakota.

for
any completion method
at
any working pressure

NATIONAL WELLHEAD EQUIPMENT

Discovery well in Midland County, Texas, equipped with 10,000# pressure-test tree and casing spools for 13⅜", 9⅝" and 7⅝" casing.

On a new well in the Dollarhide—a 6000# pressure-test tree.

Series 400 assembly, with flanged Type "E" Tubing Head for parallel tubing strings, in the Spraberry.

These examples of National Wellhead Equipment demonstrate the wide range of types and sizes available for every purpose from completion to depletion. Of equal importance is the fact that these trees were assembled from standard, interchangeable parts which are stocked at National Supply Stores throughout the United States and Canada.

National Wellhead Equipment is engineered, manufactured, and completely tested at National Supply's Houston, Texas, Plant where every facility is devoted to building the safest, most dependable trees for any completion method at any depth or working pressure.

A National Wellhead Equipment specialist will help you select the proper tree for any requirement.

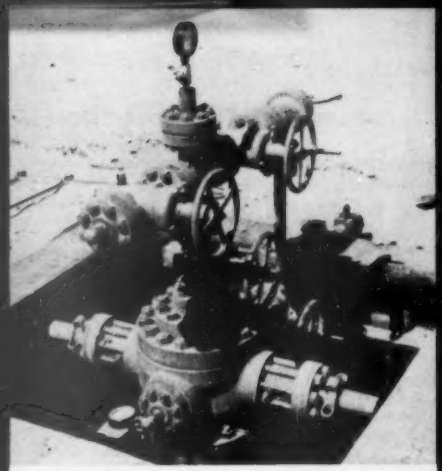
THE NATIONAL SUPPLY COMPANY

General Sales Offices: Pittsburgh 30, Pa.

DIVISION OFFICES: Casper • Ft. Worth • Houston • Pittsburgh • Tulsa • Torrance

CANADA: The National Supply Company, Ltd., 702 Barron Bldg., 610 Eighth Ave., West, Calgary, Alberta

EXPORT: 600 Fifth Ave., New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London, E.C.2



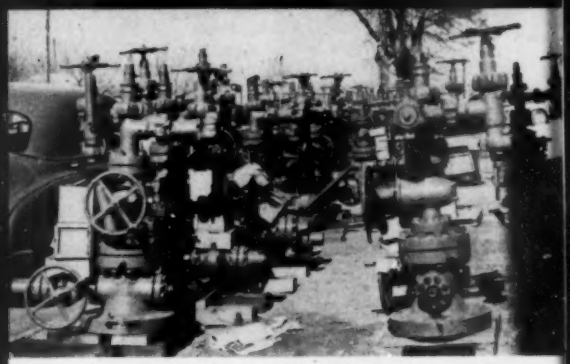
Ram-type installation on well in Lea County, New Mexico.

2000# pressure-test tree on well in Pembrook field, Upton County, Texas.

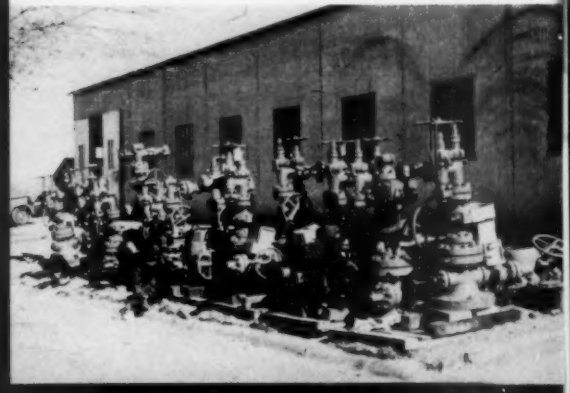
Type "E" Threaded Tubing Head on 4000# pressure test unit in Pegasus field.

- NATIONAL OIL FIELD MACHINERY AND EQUIPMENT
- SPANG STEEL PIPE
- SUPERIOR & ATLAS ENGINES

NSCO THE NATIONAL SUPPLY COMPANY — NATIONAL BLUE PRODUCTS



Stocks of National Wellhead Equipment at a National Supply Store.



string is 13⅜-in. pipe which is cemented to the surface.

Cretaceous formations . . . A 9-in. rock bit is used to drill the shoe on the surface pipe. To drill the Cretaceous section, the weight on the bit is held at from 16,000 to 20,000 lb. Pump pressures are held at 800 to 900 psig. in drilling these unconsolidated bentonitic shales. The table is turned at from 130 to 150 r.p.m. Under these conditions, straight-hole drilling is easy and the hole can be held to 1° without any difficulty.

Upper Cretaceous rocks to the Greenhorn limestone have been drilled with about 6 rock bits; a total of about 17 to 18 rock bits are required to reach the Spearfish (Triassic). Footage per bit on the 9-in. are high, as noted from the accompanying correlation:

NINE-INCH BIT DRILLING PERFORMANCE—DEEP TESTS IN EASTERN MONTANA
(Data: E. A. Polumbus, Jr., Denver, Colo.)

Operator and well—	No. bits	Footage cut	Drilling hours	Bit performance		
				Ft./hour	Ft./bit	Hours on bottom/bit
Shell Oil 34-26-G	76	8,315	880.0	9.4	109	11.6
Texas Co. G-1 NPRR	71	7,982			112.4	
Shell 1 Fee (Pine unit)	56.3	7,752	794.8	9.7	137.8	14.1
Shell 1 NPRR (Richey)	31	5,924	608.3	9.8	191.1	19.6

DIAMOND-BIT CORING PERFORMANCE RECORD, SHELL OIL CO. 1 PINE UNIT FEE, WIBAUX COUNTY, MONTANA
(Data: E. A. Polumbus, Jr., Denver)

Bit diam. (in.)	No. of bits	Footage cut (ft.)	No. hours coring (hr.)	Bit performance		
				Ft./hr.	Ft./bit	Hours on bottom/bit
7½	1	11	6.8	1.6	11.0	6.8
7	2	21	12.0	1.7	10.5	6.0
8¾	6	1,149	659.0	1.7		
Totals	9	1,181	677.8			

Drill-Collar Practice

Exploratory wells . . . Drill-collar practice employed on exploratory wells differ widely among contractors and companies.

In drilling the discovery well at Pine unit, Pioneer Drilling Co., working for Shell Oil Co., made up nine 6¼-in. drill collars after drilling out the shoe under the surface pipe. When a depth of 6,000 ft. was reached, the bore hole had drifted to 2°. Contractor added six more collars to the string and this practice corrected the deviation; the remainder of the hole was drilled to 9,747 ft., averaging 1° deviation.

Gray Wolf Drilling Co., working for The Texas Co. at Cedar Creek, G-1 NPRR, started out with four 8-in. drill collars under the shoe. At 1,800 ft., six 6-in. drill-collars were run and three 6-in. collars added to the string at 3,000 ft. At a depth of 4,800 ft., fifteen 6-in. collars were carried and this practice continued to total depth of 9,079 ft. This corrected at 2° deviation at 6,750 ft.

McConnell Drilling Co., working for Shell Oil Co. at Richey, made up six 6-in. drill collars at 2,200 ft., added two more at 4,400 ft., and three additional at 6,400 ft.; thus a total of 11 collars were carried the remainder of the hole to 10,518 ft., total depth.

Development wells . . . On developmental wells in the Glendive area, Pioneer Drilling Co., working for Shell, starts out with four 6¼-in. drill collars. At a depth of 2,700 ft., five 6⅞-in. collars are made up on the string, and none added for the remainder of the well.

Coring Performance

Exploratory wells . . . Drilling exploratory wells in eastern Montana requires a large amount of diamond coring, particularly in the Mississippian and Devonian formations. The discovery well of the Pine unit field cut 17 diamond cores in these two formations throughout a section from 7,150 to 9,747 ft., total depth.

The accompanying summary of coring performance is presented:

During coring operations, the weight on the bit was reduced to 10,000 lb. However, on reaming, weight on bit was increased to 17,000 lb.

Developmental wells . . . On developmental wells, such as Shell's 34-26-G, in the Glendive area, only one diamond core was required in the entire well. It was a section of 81 ft. of Devonian cut with an 8⅞-in. core head. Core-bit performance was fast, the section being cut in 22.5 hours on an average of 3.6 ft. per hour.

Drilling Fluids

Cretaceous . . . A bentonite mud, especially designed to penetrate the soft bentonitic shales of the Cretaceous, has been employed by Shell in drilling its 1 Pine unit fee discovery well.

Drilling fluid practices for this well

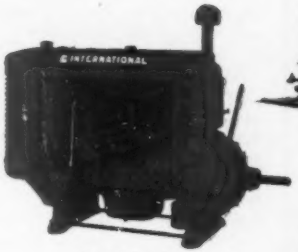
CASING AND CEMENTING PRACTICES—WILLISTON BASIN FIELDS

County, field, and discovery well—	Discovery date	Prod. wells 7-1-52	Average gravity °A.P.I.	Producing zone		Surface casing			Oil string		
				Name	Depth	Size (in.)	Seat (ft.)	Cement (sacks)	Size (in.)	Seat (ft.)	Cement (sacks)
MONTANA:											
Roosevelt:											
East Poplar—C. H. Murphy 1 Unit	9-15-51	3	40.6	Charles	5,668	13⅜	1,015	700	7	5,814	200
West Poplar—Ajax Oil Co.	3- 1-52	1	38	Charles	6,164	10¾	258	200	5½	6,271	250
Dawson:											
Richey—Shell 1 N.P.R.R.	12- 1-51	2	38	Charles	7,183-7,306	10¾	1,303	560	7	7,183	200
Cedar Creek—The Texas Co. 1 N.P.R.R.						13⅜	334	300			
Wibaux:											
Pine unit—Shell 36-26-G	5-10-52	2	39	Devonian Ordovician	8,968-9,077 9,105-9,149 9,149-9,155	13⅜	806	650	5½	9,202	225
NORTH DAKOTA:											
Williams and McKenzie:											
Beaver Lodge—Amerada 1 C. H. Iverson	1951	12	45	Madison	8,600	10¾	600	500	5½	8,600	600
Tioga—Amerada 1 Bakken	1952	2	40.6	Madison	8,146-8,220	13⅜	624	600	5½	8,220	600
Croff—Amerada 1 B. Risser	1952	1	42	Madison	9,515	13⅜	424	328	7	9,703	600

Pump Power Parade

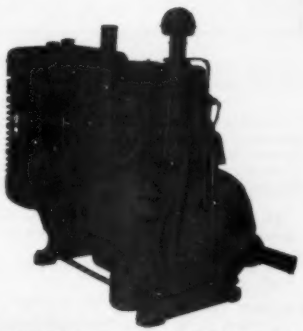
U-1, 10.5 A.P.I. max. hp. at 1800 r.p.m.

U-2A, 21.8 A.P.I. max. hp. at 1800 r.p.m.



U-6, 37.5 A.P.I. max. hp. at 1500 r.p.m.

U-4, 28.5 A.P.I. max. hp. at 1800 r.p.m.



U-9, 49 A.P.I. max. hp. at 1500 r.p.m.

5 sizes of power
5 big reasons why

ADAPTABILITY—wide range of use, easy installation

ENDURANCE—proved by thousands of hours of dependable performance

ECONOMY—low-cost maintenance, low-cost fuel

SERVICE FACILITIES—all through the oil fields

REPUTATION—the International name and all it stands for

INTERNATIONAL

INTERNATIONAL HARVESTER

POWER THAT PAYS

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

from surface to 5,000 ft. are as follows:

Item—	0 to 3,000 ft.	3,000 to 5,000 ft.
Mud weight, lb./gal.	9.1 to 9.3	9.9 to 10.3
Viscosity, A.P.I. sec.	38 to 40	38 to 42
Water loss, cc.	9 to 14	6.0 to 9.5
Filter cake, in.	2/32	2/32
pH		9

Triassic . . . Cretaceous rocks were based at 5,312 ft., which is the top of the Spearfish (Triassic) sediments. The Spearfish contains an evaporite section including rock salt from 5,470-95 ft. Drilling mud was therefore changed at a depth of about 5,000 ft. from a bentonite to a salt-base mud. The drilling-fluid characteristics from 5,000 ft. to 6,000 ft. are as follows:

Item—	5,000 to 6,000 ft.
Mud weight, lb./gal.	10.1 to 11.0
Viscosity, A.P.I. sec.	45 to 60
Water loss, cc.	5.0 to 8.0
Filter cake, in.	2/32
pH	6

At Richey discovery well, Shell used a lime Impermex mud in drilling through the Spearfish and the Otter formations; they carried a 9.5 to 9.9-lb. per gallon mud and raised viscosity from 42 to 50-58 A.P.I. seconds. To penetrate the salt sections of the Charles (Mississippian) formations, Shell changed over to a salt-base mud in the top of the Charles logged at 6,510 ft. First salt was logged at 6,866 ft. and second salt at 6,994 ft. Mud weight was increased to 9.8 to 10.5 lb. per gallon and viscosity to 50 to 58 A.P.I. seconds. These mud characteristics were followed on into the Devonian formation. The total depth of the well was 10,518 ft.

A third variation in drilling-fluid program for drilling the Spearfish and Charles evaporite sections is that employed by Shell at its 34-26-G well, NW SW SE 26-15n-54e, Glendive area of Dawson County, Montana.

FIELD RULES FOR BEAVER LODGE (MADISON) POOL, BY STATE INDUSTRIAL COMMISSION OF NORTH DAKOTA

DAILY ALLOWABLE: 200 bbl. per day for each proration unit of 40 acres.

GAS-OIL RATIO SURVEY: The gas-oil ratio of each well shall be determined quarterly (January, April, July, and October).

RESERVOIR PRESSURE SURVEY: Determined semiannually (April and October). Pressure datum: 6,200 ft. subsea. Shut-in time: minimum of 24 hours.

CASING PROGRAM: Surface string shall be set and cemented not shallower than 600 ft.; annular space cemented to surface. Minimum waiting-on-cement time: 12 hours. Pipe shall be tested hydraulically to 1,000 psig.

The oil string shall be tested hydraulically to 3,000 psig. Sufficient cement shall be run to fill the calculated volume of the annular space between the shoe and the top of the Amsden formation by 1½ times, but not less than 300 sacks of cement shall be used. Minimum waiting-on-cement time: 24 hours. This string shall be set not higher than the gas-oil contact.

WELL-HEAD FITTINGS: The christmas-tree fittings and well-head connections shall have a working pressure of 3,000 psig. or a test pressure of 6,000 psig.

From surface to 5,039 ft. the following mud mixture was employed:

Additive—	Requirements— Per day	Total
Bentonite, lb.	115	16,100
Caustic, lb.	21	295
Quebracho, lb.	59	825
Sodium bicarbonate, lb.		400

The Upper Cretaceous formations were drilled with a 9.2 to 9.8-lb. mud with a viscosity of 38 to 40 A.P.I. seconds.

At a depth of 5,039 ft., the bentonite mud was changed to a gypsum-base mud. The following requirements from 5,039 to 9,202 ft. total depth are listed:

Additive—	Requirements— Per day	Total
Brine gel, lb.	735	39,700
Barite, lb.	612	33,000
Gypsum, lb.	65	3,500
Starch, lb.	745	40,200
Driscol, lb.	8	420
Preservative, lb.	62	3,355

North Dakota Fields

Seventeen rotary drilling rigs are active currently along a 53-mile front in the Nesson anticline region near Tioga, N. D. To date, 15 Madison lime oil wells have been completed at a depth of about 8,500 ft. Twelve of these wells are situated in Beaver Lodge field, two in Tioga field, and one at Croff field.

The rigs are spread out over a distance of 53 miles from north to south and 7 miles from east to west at the widest point. Amerada has 12 rigs working; H. L. Hunt, Dallas, 3; Champlin Refining Co., Enid, 1; and American Viking-Tioga Petroleum Co., Dallas, 1.

Madison wells are drilled and completed in about 60 days from rigging-up date to the date the crude-oil flow is turned into stock tanks. All wells are producing from the Madison lime of Mississippian age. Porosity of the Madison pay consists of intergranular and vugular type accompanied by fracturing.

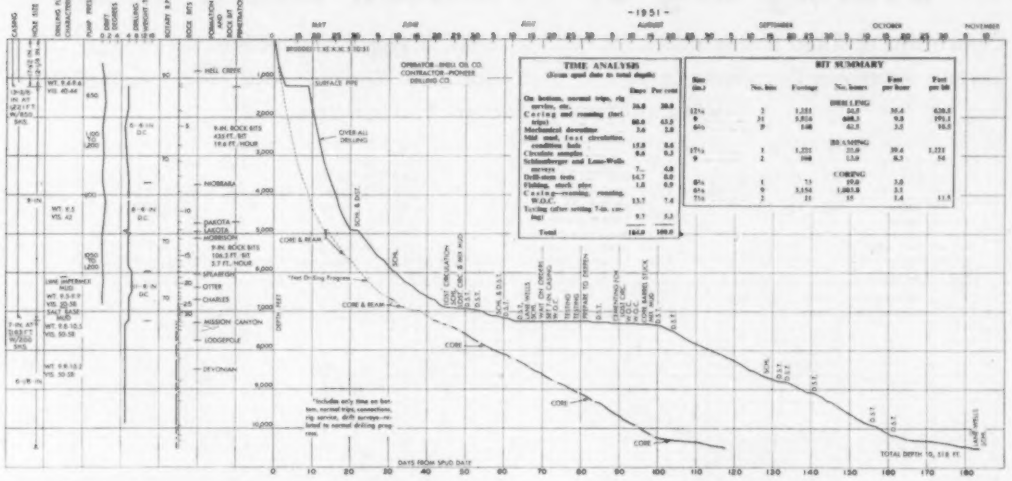
The crude oil is high quality and has a pour point below 0° F. Produced gravity averages 45° A.P.I.

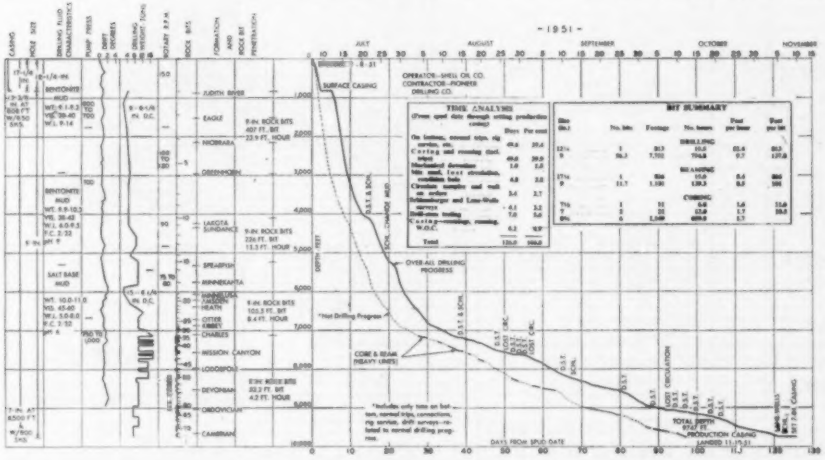
Drilling Equipment

Jackknife masts are used on Madison tests. Wells seeking deeper objectives employ standard 136-ft. steel derricks with 30 by 30-ft. base with 14-ft. substructures. Medium and heavy-duty rigs are used for Madison wells. Heavi-

TIME ANALYSIS OF MONTANA EXPLORATORY TESTS (FROM SPUDDING DATE TO SETTING PRODUCTION CASING)
(Data: E. A. Polumbus, Jr., Denver)

Item—	Glendive area, Dawson County, Shell Oil Co., 34-26-G, NW SW SE, Sec. 26-15n-54e		Glendive area, Dawson County, The Texas Co. G-1 N.P.R.R. C NE NE/4 Sec. 35-15n-54e		Pine Unit area, Wibaux County, Shell Oil Co. 1 Fee, SW SW NE, Sec. 30-12n-57e		Richey area, Dawson County, Shell Oil Co. 1 N.P.R.R., SE NW NW, Sec. 19-23n-50e	
	Days	Per cent	Days	Per cent	Days	Per cent	Days	Per cent
1. On bottom, normal trips, rig services	55.6	71.8	59.8	46.5	49.6	39.4	36.8	20.0
2. Coring and reaming (incl. trips)	1.9	2.4	29.1	22.4	49.0	38.9	80.0	43.5
3. Mechanical downtime	2.1	2.7	9.5	7.4	1.9	1.5	3.6	2.0
4. Mix mud, condition hole, lost circulation time	1.9	2.4	3.2	2.5	4.8	3.8	15.8	8.6
5. Circulate samples, wait on orders	0.3	0.4	1.9	1.4	3.4	2.7	0.6	0.3
6. Well surveys	2.3	3.0	2.7	2.1	4.1	3.2	7.3	4.6
7. Drill-stem testing	6.9	8.9	12.6	9.8	7.0	5.6	14.7	8.0
8. Casing, reaming, running, W.O.C.	6.5	8.4	3.8	2.9	6.2	4.9	13.7	7.4
9. Fishing and drill junk	0.0	0.0	5.3	4.1	0.0	0.0	1.8	0.9
10. Waiting on weather	0.0	0.0	1.1	0.9	0.0	0.0	0.0	0.0
11. Testing (after setting 7-in.)	0.0	0.0	0.0	0.0	0.0	0.0	9.7	5.3
Totals	77.5	100.0	129.0	100.0	126.0	100.0	184.0	100.0





DRILLING PROCESS CURVES . . . eastern Montana oil discoveries of Shell Oil Co. (Prepared by E. A. Polumbus, Jr., Denver).

◆1 Northern Pacific, SE NW NW 19-123n-50e, Richey field, Dawson County.

◆1 fee, SW NW NE 30-12n-57e, Pine Unit, Wibaux County.

er equipment is utilized for drilling wells to deeper horizons.

Common practice calls for butane engines totaling up to 1,000 hp. A single mud pump is able to handle all normal requirements.

Winterizing Rigs

The severe winter in the Dakotas is accompanied by temperatures as low as −45° F.

To enable drilling operations during the winter season, contractors enclose the derrick for the first three girts. In addition, two girts are covered around the fourble board.

The water well is drilled behind each rig so that the water source lies within the confines of the boiler room and will not freeze. Steam lines are laid in the same ditch as are water lines; both are buried to a depth of 1 ft.

Tank-type mud pits are employed; these are wholly enclosed to prevent freezing.

Under conditions of extreme cold, straw and coal are placed on the ground and ignited to thaw out the ground sufficiently to dig reserve pits. These pits measure 200 by 200 by 4 ft. in depth.

Drilling Practices

In starting up, cellar and reserve pits are dug, the rig with mast is moved in, and drilling commenced.

A 13¾-in. hole is cut to a depth of about 600 ft. A string of 10¾-in. surface pipe is set and cemented with 500 sacks. Field rules prescribe that the surface pipe be set at a minimum depth of 500 ft.

Madison wells . . . On tests projected to the Madison lime, operators cut an 8¾-in. hole to run a string of 5½-in. casing to a depth of approximately 8,600 ft. Six hundred sacks of cement are placed behind the pipe.

If the well is designed to be carried to the Devonian formation, operators will drill a 12-in. hole and a string of 7⅝ or 9⅝-in. pipe will be set at 6,000 ft.; 600 sacks of cement are placed behind the pipe. Six-inch drill collars are run on the bottom of a string of 4½-in. drill pipe.

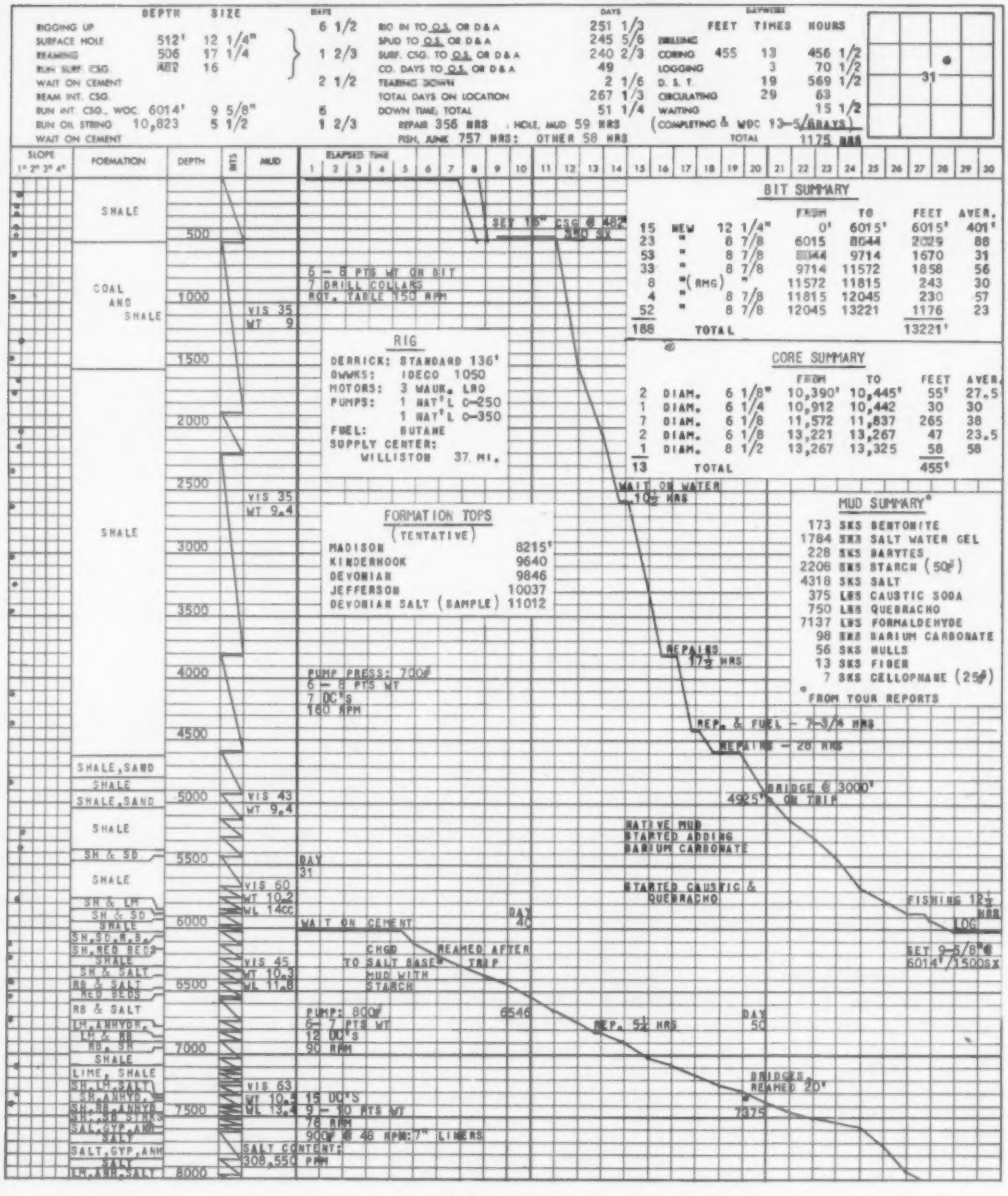
Mud program . . . When the Spearfish formation is encountered (usually at a depth of 6,000 ft.) crews change drilling fluids from an Aquagel mud to a salt-base mud. This is done primarily be-

(Continued on page 107)

Drilling Log of Williston Basin Well

Contractor: Loffland Brothers — Well: 1 Palmer H. Dilland

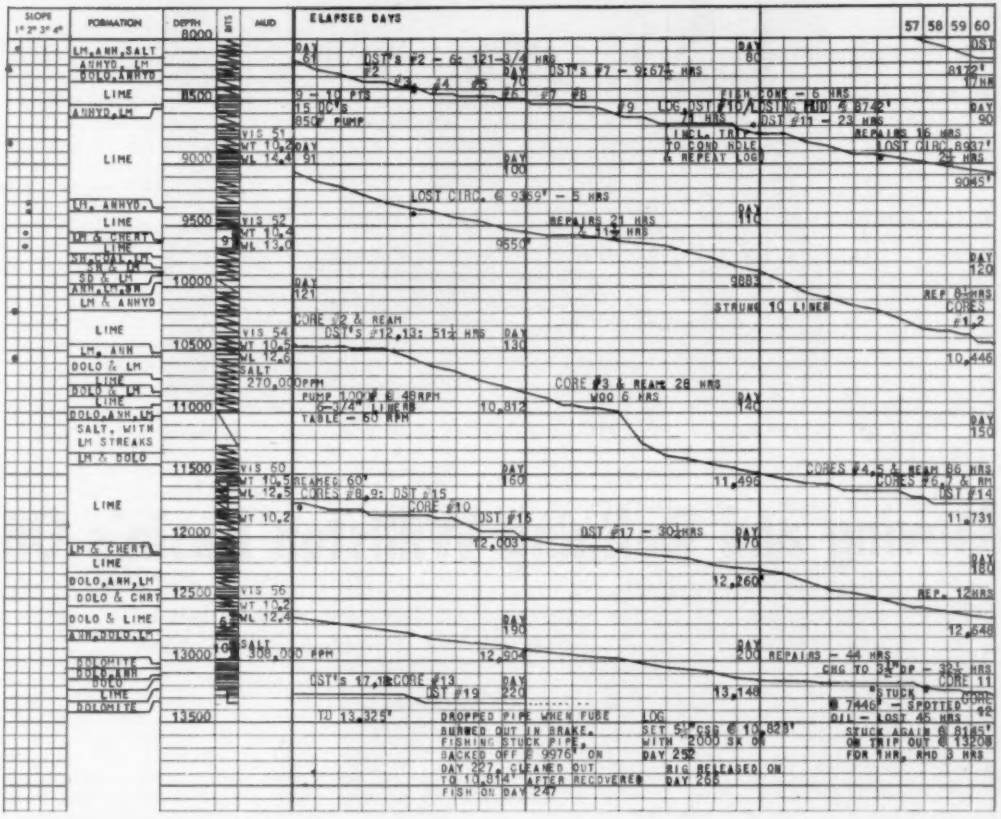
Owner: Amerada Petroleum Corp. — Location: Beaver Lodge Field, North Dakota, Williams County, Section 31-156n-95w.



(Continued on next page)

Compiled for The Oil and Gas Journal by Drilling Data Service, Oklahoma City

(Continued from opposite page)



Big Drilling Campaign in Prospect

(Continued from page 105)

cause formations below the Spearfish are predominantly limestone with anhydrite and salt sections.

Well-logging devices . . . Penetration of the evaporite section and the use of salt-base mud requires a change in logging methods from those conventionally employed. Because of these two conditions, conventional resistivity and spontaneous potential electric logs lose much of their resolving power in determination of lithology and fluid content of porous formations encountered. Thus from 6,000 ft. to total depth, logging consists of MicroLog, gamma ray, neutron and Laterolog. In addition, the limestone sonde is run.

Completion Practices

Several Madison wells have been cored, over intervals of approximately 200 ft. of section. Core recovery is high; in most cases 100 per cent of the formation is recovered. A 6⅛-in. diamond head is employed commonly; it cuts a 3¾-in. core.

Irrespective of the objective being the Madison or the Devonian, field practice calls for running the oil string to bottom after completion of all electric and radioactivity well-logging surveys. Casing is then jet perforated; a density of four holes per foot is followed.

Porosity is determined from the MicroLog, gamma ray, neutron, and Laterolog surveys.

Acidation . . . Following casing and perforating operations, a string of 2-in. 4.7-lb. external upset tubing is run in the hole with a production packer on bottom. Oil is left in the annulus above the packer. The well is brought into production by swabbing; it is cleaned and turned into stock tanks. Most wells are treated initially with 1,000 gal. of low-surface-tension acid on completion.

Gas separation . . . Horizontal as well as vertical gas separators are installed at wells completed on the Nesson anticline. Working pressure is 125 psig. Hydrate formation to date has been negligible.

Stock tanks are 1,000-bbl. bolted-steel units. In a few cases, where water is produced, a conventional 6-ft. heater-treater gun barrel is installed.

Individual wells are produced at rates of 200 bbl. per well per day under state-wide rules which impose a limiting gas-oil ratio of 2,000 cu. ft. per bbl. of oil.

Crude Characteristics

Oil produced from the Madison reservoir exhibits an average produced gravity of 45° A.P.I. Color is green by reflected light and orange by transmitted light. The pour point is below 0° F. and has a low viscosity; the Saybolt Universal rating is 37 seconds at 100° F. according to Elmer R. Erickson, executive vice president of Northwest Refining Co., St. Paul Park, Minn. The gravity of the oil received at the refinery is 42° A.P.I. at 60° F.

NORTH DAKOTA CRUDE from Beaver Lodge field moves 10 miles south by pipe line to Tioga where it is loaded for rail shipment out of the basin.

Moving and Refining Williston Basin's Oil

Production is assured — now come the next steps. Here's a look at the immediate picture, and an analysis of problems that lie ahead

by John C. Casper
Associate Editor

PRODUCING Williston basin's crude is the immediate problem. Getting that crude to an adequate and profitable market is the next problem. It is not a simple problem.

How soon that problem will become acute depends on how fast Williston's reserves are proven up—probably within 1 to 4 years.

Before the problem does become serious it is probable that one or several refining or pipe-line companies will have come forward with an economical plan, so that Williston basin producers can sell their crude at a reasonable price.

Just what that plan will be, nobody is prepared to say at the moment. A good many companies are eyeing the possibilities, but no one is ready to talk details.

The best outlet might be a group of small refineries scattered through the basin. Or one big refinery in a strategic location, perhaps at the eastern end of the basin. Or, if a crude pipe line is the answer, the line might run east, or southeast, or south—or even west.

This article is a discussion of some of the economic factors which must be considered before the construction of any facilities to market large quantities of Williston crude. It is based on discussions with a number of oil men who are studying the problem.

Problems like Rockies . . . While most of the United States portion of the Williston basin is in PAD District 2 (the Great Lakes-North Central states), the economic problems involved in the disposition of the crude are almost identical with those of the Rocky Mountain areas in District 4.

District 4 has a surplus of crude over and above the demands within the district. The volume of this surplus has increased somewhat since the end of the war. In 1946 crude production in District 4 averaged 163,400 bbl. daily compared with refinery runs of 120,600 bbl. daily. The excess crude moved out of the district by pipe line to the high-demand areas of the North Central states. In the first quarter of this year production averaged about 294,000 bbl. daily compared with refinery runs of 222,000 bbl. daily or an excess of about 72,000 bbl. daily.

In like manner, any large volume of production developed in Williston basin will have to find a market for the crude that is produced in excess of the demand within the area. The surplus can be moved out either as crude or as refined products if the crude is processed within the district.

Dakota demand . . . At the present there is no actual shortage of products within the Williston area. Total demand for products in North and South Dakota is estimated at about 60,000 bbl. daily. This demand is being supplied by pipe lines on the eastern side of the two-state area and from refineries in the adjoining states to the west and southwest.

Refineries in the southern part of Montana have capacities totaling about 40,000 bbl. daily. Refining capacity of the central and eastern portions of Wyoming amounts to about 140,000 bbl. daily. In addition, there are a few small plants in western Nebraska, but these serve only local demands.

On the eastern side, products from five pipe lines are available at points along the border. The southeastern corner of South Dakota has four products lines: Champlin Refining Co.; Standard Oil Co. (Ind.); Socony-Vacuum Oil Co., Inc.; and the western leg of the Great Lakes Pipe Line. The Great Lakes line also has a branch that serves the east-central portion of

South Dakota, and the eastern leg terminates at Grand Forks, N. D. Stanard Oil Co. (Ind.) also has a line from Chicago to eastern North Dakota.

At the present the only part of Williston basin that has high-cost distribution of petroleum products is in the central portion. Products for this area must move by tank car from the refineries in Montana and Wyoming or from the pipe-line terminals in the East.

Refinery sites . . . A refinery located in the middle of the basin would have a decided transportation advantage in supplying local demands, but at present these demands are relatively small.

Potential production on a large scale in Williston basin again brings up the question of the best location for a refinery to process the crude.

In the past 25 years there has been a shift in the method of handling surplus crude from a flush area. At the time of the early discoveries of major pools in the Mid-Continent and Southwest, refineries were built near the fields, drawn by low-priced crude that came with uncontrolled production in rapidly developing pools. In recent years the trend has been toward adding enough refining capacity to take care of the local demand with the excess moving out by pipe line to compete with crudes from other areas at large refining centers.

The problem of fitting Williston production into the over-all supply-and-demand picture of the country will call for further study to see if all conditions are similar to those in the Southwest and Rocky Mountains where the trend has been toward movement of excess crude out of the area.

Sad paradox . . . The answer—whether refineries or pipe lines or both—will depend largely on two things: How fast Williston builds up sustained capacity to produce large quantities of crude; and the relative needs for oil in other parts of the United States which can be reached from Williston.

But there is one sad probability in all the speculation and planning:

There most likely will be a period in which Williston operators cannot sell all the crude they can produce because their capacity will be greater than the ability of purchasers to handle it and get it to market economically at the moment.

This paradox of production has been the history of most new producing areas. The first crude finds a market because it is produced in small quantity. Then production builds up beyond the ability of the immediate market to absorb it, but not yet large enough to justify installation of a pipe line or a refinery. So production is curtailed while development continues. Finally the proven reserves are sufficient to attract investment in process or transportation facilities. Then drilling, production, and sales can go forward in step with each other.

Deferred price . . . At present Williston basin crude (Beaver Lodge field) has a posted price of $2.00 per barrel. Crude of comparable quality and gravity in the Mid-Continent brings $2.65 per barrel.

Why this discrimination? Simply because the Mid-Continent is dotted with refineries and crisscrossed with pipe lines. Williston crude must move long distances by railroad tank car—a high-cost method of transportation.

When transportation costs stop taking such a big bite out of the market value, Willistson crude will command a higher price at the well. But until that time comes it is quite possible that

STRONG?

TWO LEBUS LOAD BINDERS HOLD 64,000 LB. LOAD!

Picture above shows full load of 64,000 lb. rig, after being boomed down with LeBus Load Binders.

"They just don't break"

says CHARLES LITTRELL, Driver, Herman Graham Drilling, Salem, Illinois

In a conversation, overheard about Load Binders, while the above rig was being loaded, Charles Littrell stated . . . "I feel LeBus Load Binders are the best Load Binders on the market." Littrell further said "I have never lost a load that was tied down with a LeBus Load Binder." Littrell was asked if he had ever seen a LeBus Load Binder break when a cheater bar was used . . . His Answer . . . "I have seen as many as four (4) men on a cheater bar and still those LeBus Load Binders wouldn't break. As for making a load safe, I'll use LeBus Binders Every Time."

This photo shows Charles Littrell cinching down LeBus Load Binder No. 1 at the head end of his trailer and load.

Here is a LeBus Load Binder No. 2 on the tail end of the trailer, beneath the engines of this rig.

LEBUS

SEE YOUR SUPPLY STORE or WRITE FOR BULLETIN

LEBUS ROTARY TOOL WORKS

P. O. Box 2352 LONGVIEW, TEXAS Phone 1232

Williston producers will be able to sell only a part of what they are capable of producing, even at this depressed price.

Nobody is going to move into the Williston basin with a big investment in refineries or pipe lines until he is satisfied that the area's producibility—its proven reserves—will sustain production at a rate high enough to operate his facilities at near capacity for a period long enough to pay out the investment.

Some company may feel that this time has arrived within a year from now. Or it may take 2 or 3 years or even more.

Twin Cities market . . . At present North Dakota is producing about 3,000 bbl. of crude per day. Most of this moves by rail to refineries in the Minneapolis-St. Paul area. The price of $2.00 for Beaver Lodge crude was set to make it competitive with crude which these refineries had been purchasing from other sources.

These Twin City refineries are not large enough to take all the crude Williston is likely to produce within a year or so. Then Williston crude will have to seek other outlets. Even the entire Minnesota-North Wisconsin consuming area probably could not absorb all the crude Williston may be producing in a couple of years—and much of that demand will be met from other sources such as Alberta.

When refining capacity is established in North Dakota, local crude will find a ready market up to the capacity of the refineries, or at least up to the demands of the normal marketing area. However, refinery construction has not started and probably will not be started until some company is satisfied that proven reserves in the area will support a refinery that is large enough to operate profitably in the area.

Marketing problems . . . There have been guesses as to the probable location of a North Dakota refinery. It has been suggested that the plant could be built in the Fargo area and use the existing product lines to extend the marketing area of the refinery. This would call for a crude line across the state and probably a products line back to the central part of the basin.

Such a plan would permit a larger refinery but would lose the advantage of low-cost distribution in that part of the two-state area near crude production. Some other refiner would probably move into the center of the crude-producing area with a small plant that would serve local needs.

Indiana Standard Announces Location of Williston Basin Refinery

SINCE this article was written Standard Oil Co. (Ind.) announced that it will build its refinery at Mandan, N. D., across the Missouri River from Bismarck.

Construction is expected to begin early in 1953 with initial operation scheduled for about the middle of 1954.

Indiana Standard's plans for the area include a products line to Morehead, Minn., where it will connect with the company's existing products pipe-line system.

Service Pipe Line Co., a Standard subsidiary, will build a crude line from Williston basin oil fields to the refinery.

Another suggestion has been a larger refinery in the central portion of the basin with a products line tying in with existing lines along the eastern border of the state.

Since North and South Dakota are served from the fringe areas by refineries or pipe lines, the establishment of a refinery within these states will tend to shove back the marketing areas of the refineries or pipe-line terminals along the states' borders. In the long run it will mean that normal expansions in the fringe area will be replaced by the refinery development within the states.

Standard Oil Co. (Ind.) has announced plans for a refinery in the basin with an initial capacity of 15,000 bbl. daily and a probable final capacity of about 30,000 bbl. daily. A new organization, Williston Refining Co., also has announced plans for a North Dakota refinery, this one to be 10,000 bbl. daily. The companies have not released any information on the locations of the plants.

Whither crude? . . . The big questions for Williston are related to the handling of the crude that is produced in excess of the demands within the area.

Will the excess move out as crude? How far must it move to find a market? Will it move toward Chicago or to the West Coast? How much producing capacity will be required for the first line?

Most of the estimates of the volume of crude that will be required as a starter for a crude line are about 60,000 bbl. daily. This does not mean that wells will have to be completed and shut in until total producing capacity is up to 60,000 bbl. daily, but that enough reserves will have to be established to support production of 60,000 bbl. daily.

The ratio of reserves to production

Analyses of Williston Basin Crudes—U.S.B.M.-Hempel

No. 1

SAMPLE.—Beaver Lodge field. Amerada Petroleum Corp 1 Clarence Iverson.
LOCATION.—SW SW 6-155n-95w, Williams County, North Dakota.
FORMATION.—Madison at 8,520-80 ft.
CHARACTER.—**Specific gravity,** 0.8035; **S.U. viscosity** at 100° F., 34.6 seconds; **pour point,** below 20° F.; **A.P.I. gravity,** 44.6°; **per cent sulfur,** 0.30; **color,** orange-green; **base of crude,** intermediate.

	Per cent	°A.P.I.
Atmospheric distillation:		
Light gasoline	14.7	77.2
Total gasoline and naphtha	41.0	61.6
Kerosine distillate	11.7	43.0
Gas oil	14.8	35.6
Nonviscous lubricating distillate	8.8	32.1-29.3
Medium lubricating distillate	4.4	29.3-27.7
Viscous lubricating distillate		
Residuum	14.9	22.8
Distillation loss	4.4	x

Tests on residuum:
Viscosity (S.U. at 210° F.), 106.2; **carbon residue,** 2.0 per cent; **pour point,** 85° F.

No. 2

SAMPLE.—Beaver Lodge field. Amerada Petroleum Corp. 1-A North Dakota.
LOCATION.—NE SE 16-156n-95w, Williams County, North Dakota.
FORMATION.—Madison at 8,490-8,512 ft.
CHARACTER.—**Specific gravity,** 0.8114; **S.U. viscosity** at 100° F., 34.6 seconds; **pour point,** below 20° F.; **A.P.I. gravity,** 42.9°; **per cent sulfur,** 0.38; **color,** greenish-red; **base of crude,** intermediate-paraffin.

	Per cent	°A.P.I.
Atmospheric distillation:		
Light gasoline	16.0	68.9
Total gasoline and naphtha	43.2	57.9
Kerosine distillate	10.0	42.6
Gas oil	14.9	35.8
Nonviscous lubricating distillate	10.6	32.7-29.3
Medium lubricating distillate	5.5	29.3-27.5
Viscous lubricating distillate		
Residuum	14.1	22.0
Distillation loss	1.7	x

Tests on residuum:
Viscosity (S.U. at 210° F.), 119.4; **carbon residue,** 3.2 per cent; **pour point,** 75° F.

"... some think ... Williston crude ... should move to Pacific Northwest."

for the country as a whole is about 13 to 1, but these are proven reserves in which the estimates for new areas are conservative. For estimations of producing capacity as a basis for building a crude line a reserve ratio of at least 15 to 1 will be used. If the line needs at least 60,000 bbl. daily and a local refinery requires 15,000 bbl. daily for the central portion of the basin reserves to support production of 75,000 bbl. daily will be required. If we use a ratio of 15 to 1, total required reserves would be about 420 billion barrels.

The reason for the very high reserves required is the fact that the pipe line to move crude out of Williston basin to areas where demand is large enough to assimilate sizable volumes of new crude would have to be about as long as the distance from West Texas to Chicago.

To the East . . . In answer to the question as to where the crude will go, one suggested solution has been offered that includes the construction of a crude line to the south which would tie into existing lines now moving crude from Wyoming to the St. Louis-Chicago area.

This would call for a new line that would be almost half as long as a complete line running directly from Williston to Chicago.

Criticism of this proposal is based on the assumption that the lines out of Rocky Mountain district will be needed to cover planned expansions in production in the Rocky Mountain states. Also the total pipe-line distance would be about one-third longer than a direct line to the Chicago area.

To the North Lakes . . . Another suggestion has been made for a line to Minneapolis - St. Paul which would cover the needs of the plants in that area. The line then would be continued to the Chicago area.

Most oil men who have studied the problem concede that this line definitely would have been built if the Williston basis development had started soon after the last war.

Since the end of the war, crude-line capacity into the St. Louis - Chicago area has been increased until there is now very little required expansion to meet the demands in the North Central states.

A new line with 60,000 bbl. daily from North Dakota to the northern part of District 2 could mean some shifts in the planned expansion in crude

Are you getting these

Extra Dividends

from Red-Strand preformed wire rope?

DO YOU KNOW that Hercules Red-Strand preformed wire rope consistently lasts longer . . . at only no premiums . . . regardless of working conditions?

Does the preformed rope you now buy have the benefits of Hercules Red-Strand . . . the only preformed rope with

Find out . . . it means money to you

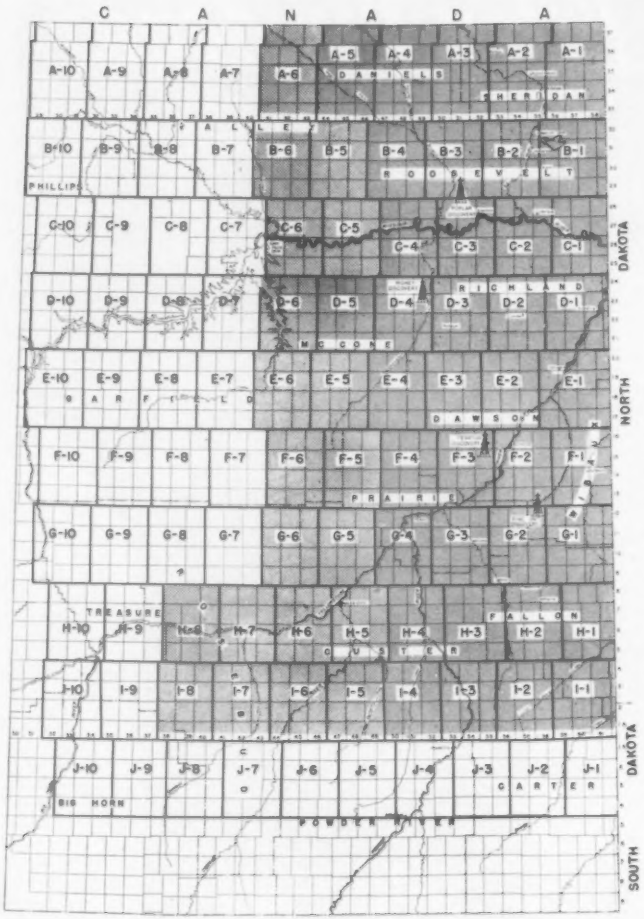
*Reg. U.S. Pat. Off.

A. Leschen & Sons Rope Co., St. Louis 12, Missouri

In business *only* to make wire rope — *better* wire rope — since 1857.

DISTRIBUTORS IN ALL PRINCIPAL CITIES

EASTERN MONTANA OWNERSHIP MAPS


C A N A D A
A-10 A-9 A-8 A-7 A-6 A-5 A-4 A-3 A-2 A-1
DANIELS
SHERIDAN
B-10 B-9 B-8 B-7 B-6 B-5 B-4 B-3 B-2 B-1
ROOSEVELT
PHILLIPS
C-10 C-9 C-8 C-7 C-6 C-5 C-4 C-3 C-2 C-1
DAKOTA
RICHLAND
D-10 D-9 D-8 D-7 D-6 D-5 D-4 D-3 D-2 D-1
McCONE
E-10 E-9 E-8 E-7 E-6 E-5 E-4 E-3 E-2 E-1
DAWSON
NORTH
F-10 F-9 F-8 F-7 F-6 F-5 F-4 F-3 F-2 F-1
PRAIRIE
G-10 G-9 G-8 G-7 G-6 G-5 G-4 G-3 G-2 G-1
TREASURE
FALLON
H-10 H-9 H-8 H-7 H-6 H-5 H-4 H-3 H-2 H-1
CUSTER
I-10 I-9 I-8 I-7 I-6 I-5 I-4 I-3 I-2 I-1
DAKOTA
J-10 J-9 J-8 J-7 J-6 J-5 J-4 J-3 J-2 J-1
CARTER
BIG HORN
POWDER RIVER
SOUTH

All of Eastern MONTANA 10,000,000 (Ten Million) Acres Are Now Available in Maps

Containing:

12 townships or over on each map.

- All Federal, State, Fee Landowners and Northern Pacific Railway Oil & Gas ownership rights.
- All Oil & Gas Leases of Record with expiration dates indicated.
- All State of Montana Oil & Gas Leases issued.
- All Federal Oil & Gas Leases and Filings applied for.
- All Roads, Towns, Streams, Etc.
- All lots, rivers and county boundaries, sections, townships and range.
- All producing wells and dry holes.
- All Producing wells and drilling wells in Williston Basin of Eastern Montana now mapped and in stock for immediate delivery. Parts or all of SHERIDAN, DANIELS, ROOSEVELT, RICHLAND, McCONE, DAWSON, WIBAUX, PRAIRIE, FALLON and CUSTER Counties, Montana, now available.

Handy dependable maps about 30" by 42", scale 1½" to mile, 12 TOWNSHIPS OR OVER IN EACH MAP.

MAPS ARE PRICED

$25.00 EACH

Order from—

SNYDER MAP SERVICE

OIL OWNERSHIP MAPS

2514 First Ave., N. (P. O. Box 1648) Phone 9-1824

BILLINGS, MONTANA

W F-3

MAPS IN STOCK AND FOR SALE. IMMEDIATE DELIVERY. Order by code letter and number A-1, A-2, A-3, A-4, A-5, B-1, B-2, B-3, B-4, C-1, C-2, C-3, C-4, D-1, D-2, D-3, D-4, D-5, E-1, E-2, E-3, E-4, F-1, F-2, F-3, F-4, G-1, G-2, G-3, G-4, H-1, H-2, H-3, H-4, I-1, I-2, I-3, I-4. Thirty-eight (38) maps over 10,000,000 acres. 12 TOWNSHIPS OR OVER IN EACH MAP.

A-1

Maps available. Accepting orders. Order by code letter and number A-6, B-5, B-6, C-5, C-6, D-6, E-5, E-6, F-5, F-6, G-5, G-6, H-5, H-6, H-7, H-8, I-5, I-6, I-7, I-8. Twenty (20) maps over 5,500,000 acres 12 TOWNSHIPS OR MORE IN EACH MAP.

I-5

Parts of Valley, Roosevelt, McCone, Prairie, Custer, Fallon, Powder River and Carter Counties, Montana, available soon, as outlined.

NOW IN PROCESS OF MAPPING ALL PRODUCING AND OTHER AREAS OF NORTH DAKOTA. All other interesting areas of Montana to be mapped. Watch for announcement of completion dates.

This is an INDEPENDENT CONCERN. These maps are made available to the public immediately upon completion with absolutely no favoritism to any company or individual as to release dates or price.

Also in stock and for sale at these dealers:

SIDNEY, MONT.—L. E. Rice, Richland County Abstract Co.
CIRCLE, MONT.—Mark LaRowe, Gladstone Hotel
WOLF POINT, MONT.—Cal Rogers, Roosevelt County Abstract Co.
GLENDIVE, MONT.—Mrs. R. E. Smith, Apt. A, Jordan Hotel
WIBAUX, MONT.—M. E. Manion, Wibaux County Abstract Co.
BAKER, MONT.—R. R. Stevens, Baker, Montana
PLENTYWOOD, MONT.—Gordon E. Hoven, Leland Hotel
MIDLAND, TEXAS—L. T. Boynton Co., 7 McClintic Bldg.

". . . probable competition is Canadian crude versus Williston crude . . ."

supply for the district. However, the effect probably would not be too great since 60,000 bbl. daily represents only 5 per cent of refinery runs in the northern part of District 2.

Still another suggestion has been for a line from the basin to the western tip of Lake Superior where the crude would be loaded on tankers for distribution either in the Chicago area or to the refining centers near Detroit.

This has the disadvantage of no lake movement during the winter months. Also the short-season tanker costs would have to compete with pipe-line costs based on a full 12-month operation.

Pacific prospects . . . There are those who think that excess crude from the Williston basin should move to the Pacific Northwest.

General trends in West Coast supply and demand indicate that the area will need to find additional high-gravity oil within the district or bring in light crudes from the outside.

Washington and Oregon in this country and British Columbia in Canada are supplied principally from California.

In the past the lack of coal on the West Coast left a good market for the residual fuel from the heavy crudes produced in California.

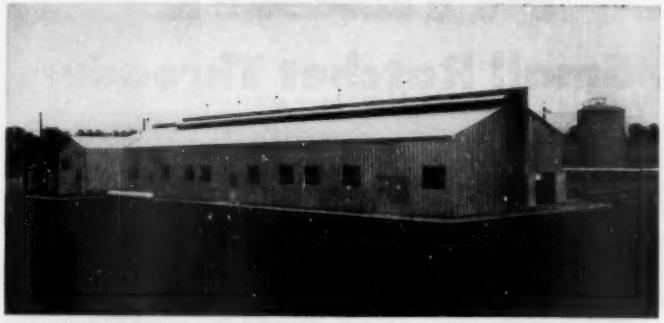
In recent years the rapid increase in the number of cars and the shifts to diesel power by the railroads have tended to increase the demand for the overhead portion of the crude barrel much faster than the demand for residuals. The need is for more light crudes to balance the demand for products.

Canadian competition . . . Probable competition for crude from Williston basin is Canadian crude through the Trans-Mountain line and Permian basin crude through the proposed lines to California from West Texas.

Initial throughput of the Trans-Mountain line has been set at about 37,500 bbl. daily. This will call for some expansion in refining capacity in British Columbia if all of the crude is to be used in that province. Crude capacity of refineries in British Columbia is now about 27,000 bbl. daily.

Since the line was designed for expansion to 150,000 bbl. daily compared with current total domestic demand in British Columbia of about 50,000 bbl. daily, profitable operation of the line on a long-term basis will depend on exports of either crude or products from British Columbia.

Why Oil Men Specify Butler Buildings



SPECIALLY ADAPTED Butler Building, shown above, has brick fire wall through center of building. The building is used as a compressor station for a gas pipe line transmission company, Lebanon, Ohio.

STRAIGHT SIDEWALLS, trussclear interior give maximum space for stacking in oil company warehouse at Oklahoma City, Okla.

PUMPING ENGINE HOUSE pictured here is a Butler Packaged Building, one of 18 used by an oil company at Lorraine, Kans.

In production, refining, marketing, Butler Aluminum-Covered Buildings offer these advantages:

(1) High reflectivity for insulation.

(2) Lightweight, yet sturdy and durable for longer life with less maintenance.

(3) Easily erected.

(4) Adaptable to meet any building need.

(5) Low cost.

(6) Weathertight.

(7) Wide range of sizes.

Choose Butler Buildings . . . proved in use in the oil industry for more than 40 years.

Straight Sidewalls . . . Use All the Space You Pay For

For prompt reply, address office nearest you:
BUTLER MANUFACTURING COMPANY
7464 E. 13th St., Kansas City 3E, Missouri
964 6th Ave., S.E., Minneapolis 14, Minnesota
Dept. 64, Richmond, California

Send full information about Butler Buildings for use as

Name_____
Firm_____
Address_____
City_____ Zone____ State____

BUTLER STEEL PRODUCTS
BUTLER MANUFACTURING COMPANY
KANSAS CITY, MISSOURI
Galesburg, Illinois
Richmond, California
Birmingham, Alabama
Minneapolis, Minnesota

WHY SKILLED WORKMEN Prefer RIDGID Small Ratchet Threaders

Drop head sets to thread ¼" to 2"

These Drop Head Dies Give You *Extra* Fast Easy Pipe Threading

- ★ Heads snap into ratchet ring from either side, won't fall out.
- ★ Precision-cut alloy dies reverse for close-to-wall threads—no special dies needed.
- ★ 00R & 0R, ⅛" to 1"; 111R and 11R, ⅛" to 1¼"; 12R, ⅛" to 2". Conduit dies available.
- ★ Buy at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID
Work-Saver Pipe Tools

"Williston basin crude is high gravity, large gasoline fraction."

Since any line from Williston basin to the Pacific Northwest will be started only after reserves have been established to support surplus production of at least 60,000 bbl. daily, the Trans-Mountain line will have the advantage of actual crude available for export from the west coast of Canada before a line from Williston basin to Washington can be completed. However, for the Canadian crude to compete with Williston basin crude in Washington and Oregon, its production and delivery costs will have to be enough below that of Williston basin crude to cover the import tax.

Good crude . . . Williston basin crude is high gravity with a large gasoline fraction. It would meet the West Coast's need for more gasoline and distillate fuels. The big problem will be to develop the needed reserves and build a line before the West Coast demand is balanced by crude from Canada and West Texas.

Demand for petroleum products in Washington and Oregon is estimated at about 260,000 bbl. daily. This would indicate that the combined areas of Washington and Oregon in this country and British Columbia in Canada will need receipts of crude or products ranging between 300,000 and 350,000 bbl. daily unless substantial crude reserves are developed within the area.

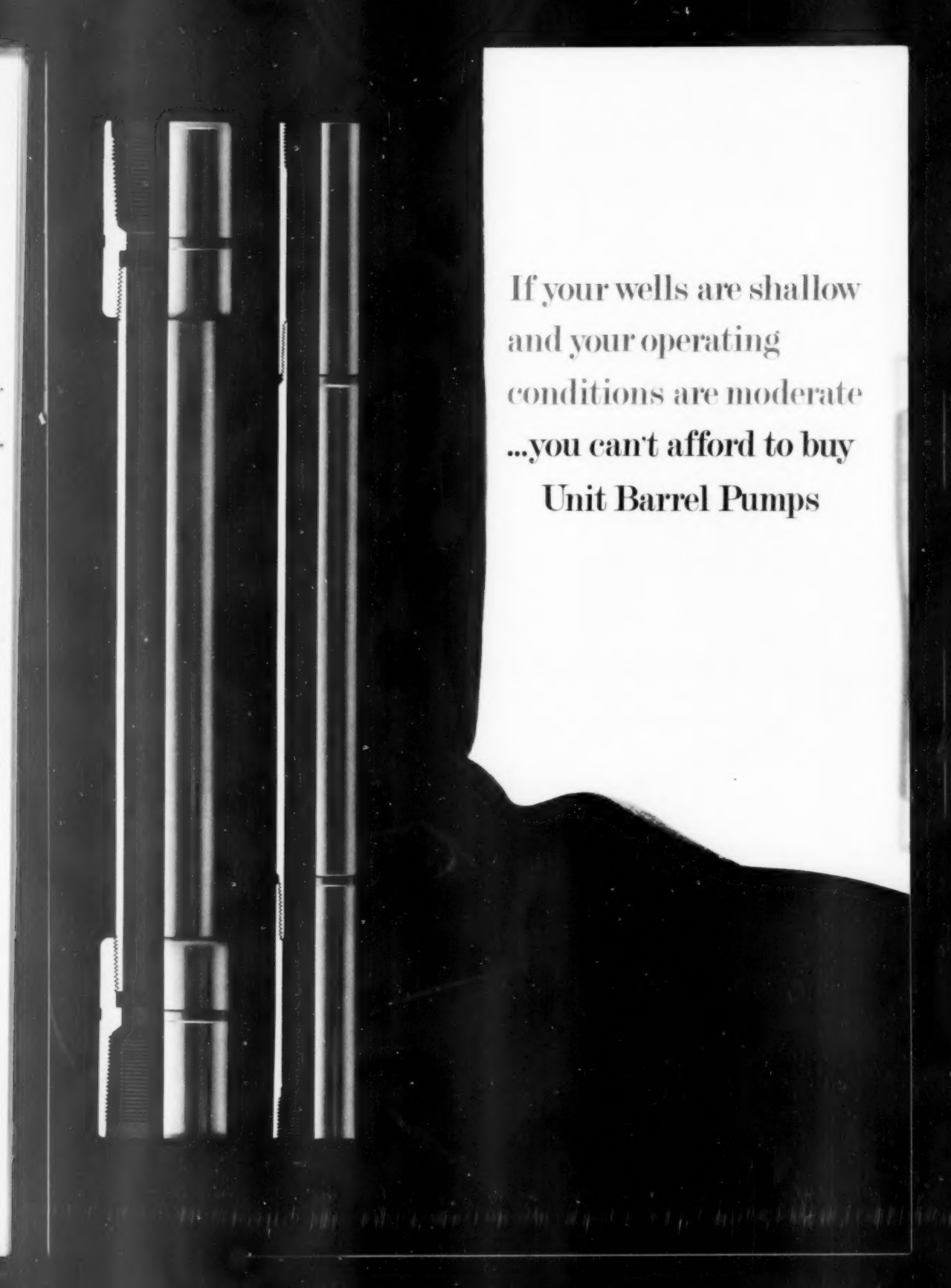
If California demand increases to the point where all of the state's production is needed to meet the oil deliveries within the state, demand in Washington, Oregon, and British Columbia would support a crude line out of the Williston basin in addition to the planned total of 150,000 bbl. daily through the Trans-Mountain line.

Some estimates of the rate of development in Williston put potential production at the end of 1954 high enough to meet local demands plus 60,000 bbl. daily for a pipe line. This may seem like slow development to a landowner with good potential acreage, but the period seems reasonable when compared with the 4 years that elapsed between the first steady production at Leduc in Alberta and the delivery of the first Alberta crude to the refinery at Sarnia.

BOOKS

THE FINANCIAL POST SURVEY OF OILS, 1952. Published by Maclean-Hunter Publishing Co., Ltd., Montreal, Quebec, Canada. 300 pp. $2.

This book reviews oil and natural-gas companies, both active and inactive, oil


If your wells are shallow
and your operating
conditions are moderate
...you can't afford to buy
Unit Barrel Pumps

If your wells are deep
or your pumping
conditions are
exceptionally severe

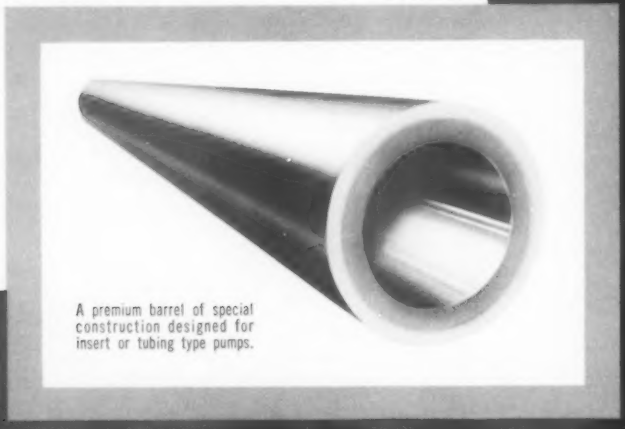
... you can't afford

not to buy

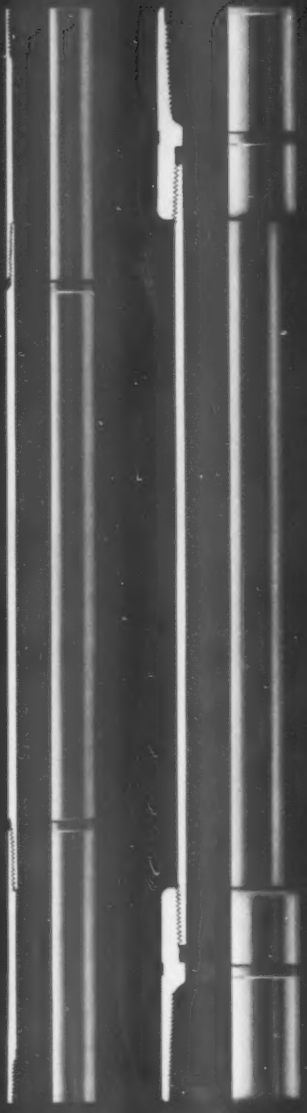
oilmaster

Unit Barrel Pumps

Write for Descriptive Literature



A premium barrel of special construction designed for insert or tubing type pumps.



Fluid Packed Pump Company

MAIN OFFICE AND PLANT, LOS NIETOS, CALIFORNIA

Distributed by The National Supply Co., Pittsburgh, Pa.

Export: The National Supply Co., Inc., Export Division, 600 Fifth Avenue, New York

Co-Distributors: Berry Supply Store, Beacon Supply Co., Industrial Supply Co.

oilmaster
PUMPS
FOREMOST IN THE INDUSTRY

royalties, maps, production tables, and price ranges, in Canada. The company reviews give such information as head office, property, royalty assets, capitalization, dividends, directors, development, gas reserves, and other data.

FEDERAL OIL AND GAS LEASING OF PUBLIC AND ACQUIRED LANDS. By Harry M. Edelstein. Reprint from Vol. 24, No. 3, Rocky Mountain Law Review, April 1952. Available from Boulder Daily Camera, Boulder, Colo.

The United States is the largest oil and gas lessor in the country. This is so even though we take into account only the public and acquired lands of the United States and exclude Indian lands and submerged coastal lands. The Department of the Interior administers the oil and gas leasing program on those public and acquired lands. The purpose of this article is to describe the significant characteristics and policy guideposts of that program.

DU PONT — THE AUTOBIOGRAPHY OF AN AMERICAN ENTERPRISE. Distributed by Charles Scribner's Sons, New York. 138 pp.

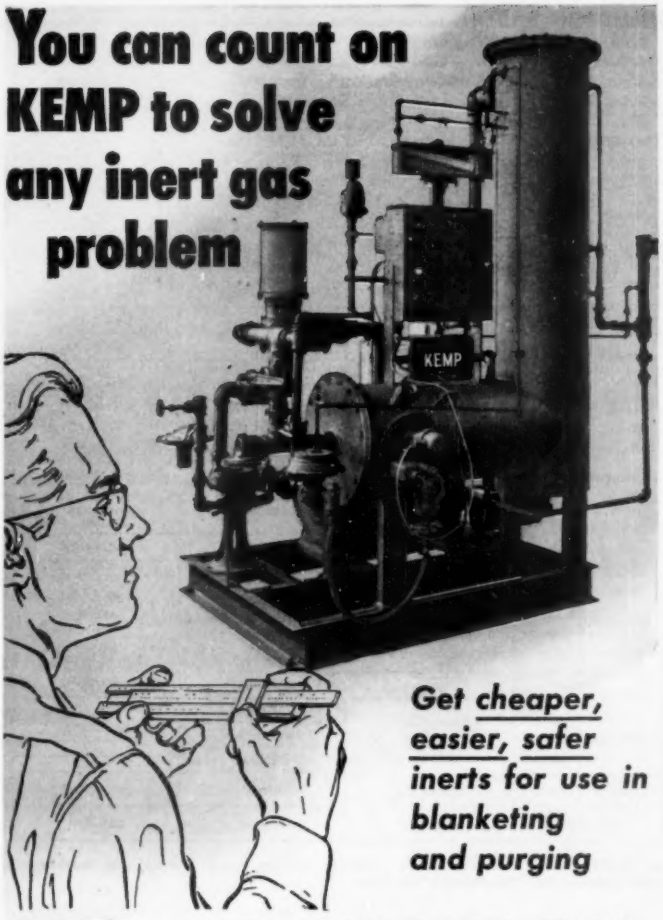
Prepared in connection with Du Pont's 150th anniversary on July 18, this handsome volume traces the company's role in the growth and development of the nation. Pictures and text sketch the broad United States social and economic patterns of the last century and a half, underscoring the company's advance to satisfy the country's expanding needs. The book is being distributed primarily to employes and stockholders.

STATISTICS OF OIL AND GAS DEVELOPMENT AND PRODUCTION COVERING 1950. Assembled by Production Review Committee, Petroleum Branch, A.I.M.E., E. W. Berlin, chairman. Published by American Institute of Mining and Metallurgical Engineers, New York 18, and 408 Trinity Universal Building, Dallas. 542 pp. $7.

This volume is divided into domestic and foreign statistics, with the domestic being further divided into chapters covering 28 individual states, and additional chapters on Hugoton gas field, Rocky Mountain region, and Southeastern states. The foreign portion covers all the oil-producing areas for which information is available. Typical breakdown of a state's data include production, production by secondary recovery, new fields, exploration and drilling activity, extensions to old reservoirs, and extensive tables tabulating all information. Maps are used liberally, and use is also made of charts.

1951 SUPPLEMENT TO BOOK OF A. S. T. M. STANDARDS. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia 3. Published in six parts. $3.50 per part.

To keep up to date the triennially published Book of A. S. T. M. Standards, the society in the intervening years issues supplements to each part of the book. The 1951 Supplements give in their latest form some 299 specifications, tests, and definitions which were either issued for the first time in 1951 or were revised since their appearance in the 1949 Book or the 1950 Supplements. The parts are (1) Ferrous Metals, 416 pp.; (2) Nonferrous Metals, 360 pp.; (3) Cement, Concrete, Ceramics, Thermal Insulation, Road Materials, Waterproofing, Soils, 280 pp.; (4) Paint, Naval Stores, Wood, Adhesives, Paper, Shipping Containers, 264 pp.; (5) Textiles, Soaps, Fuels, Petroleum, Aromatic Hydrocarbons, Antifreezes, Water, 344 pp.; (6) Electrical Insulation, Plastics, Rubber, 248 pp.



DAY AFTER DAY Kemp users throughout the petroleum industry report: Kemp Inert Gas Generators, unlike old-fashioned makes, are fast-starting, easy-to-operate . . . save both time and money by reducing costly warm-up period necessary for starting. And every Kemp unit is designed to maintain an *exact analysis* of chemically clean inert gas . . . *regardless* of demand, *regardless* of your blanketing or purging requirements. You can't go wrong when you specify time-tested Kemp Inert Gas Generators.

Set it . . . forget it!

The Kemp Industrial Carburetor, standard equipment and the very heart of every Kemp installation, assures you complete combustion . . . without tinkering . . . without waste. Uses ordinary gas right from mains. Every Kemp Design includes complete up-to-the-minute fire checks and safety devices. Why not find out how Kemp can help you with your problems?

KEMP OF BALTIMORE

INERT GAS GENERATORS

Write for Bulletin I-10 for technical information

THE C. M. KEMP MFG. CO.
405 E. Oliver Street, Baltimore 2, Md.

		EASTERN MONTANA	NORTH DAKOTA	SOUTH DAKOTA
CRETACEOUS	?	DAKOTA	DAKOTA	DAKOTA
	LOWER	FUSON	FUSON	FUSON
		LAKOTA	LAKOTA	LAKOTA
JURASSIC	UPPER	MORRISON	MORRISON	MORRISON
		ELLIS	SUNDANCE	UNKPAPA
				SUNDANCE
TRIASSIC		SPEARFISH	SPEARFISH	SPEARFISH
PERMIAN	?	EMBAR: MINNEKAHTA	S W ONLY?: MINNEKAHTA	MINNEKAHTA
		OPECHE	OPECHE	OPECHE
	?	TENSLEEP	MINNELUSA	MINNELUSA
PENNSYLVANIAN		AMSDEN	AMSDEN	
?			?	ABSENT
MISSISSIPPIAN	CHESTER AND MERAMEC	BIG SNOWY: HEATH	BIG SNOWY: UNDIVIDED	?
		OTTER		
		KIBBEY	KIBBEY	BIG SNOWY: ?
		CHARLES	CHARLES	CHARLES
			?	
	OSAGE	MISSION CANYON	MADISON	PAHASAPA
		LODGEPOLE		
			KINDERHOOK	ENGLEWOOD
DEVONIAN	UPPER	THREE FORKS	MANITOBAN	ABSENT (Possibly present in depth of Lemmon syncline)
	MIDDLE	JEFFERSON	WINNIPEGOSAN	
			ELM POINT	
			ASHERN	
SILURIAN			STONEWALL	
ORDOVICIAN	UPPER	BIG HORN	STONY MTN.	WHITEWOOD
			RED RIVER	
	MIDDLE		WINNIPEG	
CAMBRIAN	UPPER	DEADWOOD	DEADWOOD	DEADWOOD
PRE-CAMBRIAN		BASEMENT	BASEMENT	BASEMENT

Fig. 6—Correlation table for eastern Montana, western North Dakota, and northwestern South Dakota. (See "Stratigraphy" in text).

Williston Basin Today's Most Exciting Oil Province

(Continued from page 96)

general agreement, especially from the Triassic-Spearfish down.

The accompanying correlation table for eastern Montana, western North Dakota, and northwestern South Dakota (Fig. 6) is included for the sole purpose of presenting the nomenclature now being used in these areas. It is imperative to point out that there still exists considerable confusion in correlations. This table has been compiled from the ideas of many stratigraphers and will not meet with agreement from any one.

The problem of developing acceptable stratigraphic correlations stems from the dearth of deep wells within the broad area which is devoid of pre-Cretaceous outcrops. To add to the confusion, many of the pre-Cretaceous formations found in the deeper parts of the Williston basin are not found in the outcrop areas beyond the edges of the basin.

From the few deep tests now available for correlating, three wholly different sets of nomenclature are possible —one from the outcrops and known stratigraphic sections in Montana, another from outcrops in the Black Hills, and a third from the outcrops in southwestern Manitoba. Correlations working toward the Beaver Lodge from these areas will give a combination of three sets of tops.

Additional drilling between the three outcrop areas is needed before any semblance of uniformity of nomenclature can be expected in the deeper rocks of the Williston basin.

Reserves and Production

Discoveries in North Dakota and eastern Montana have yielded indications that a large supply of crude oil may soon be available from the Williston basin area. Just how much recoverable oil does the basin contain? What rates of production can be expected?

Those questions are being asked by those who will build the pipe lines out of the area and by those who will supply or build the refining capacity to process this crude. (See discussion on marketability of Williston crude, this issue.)

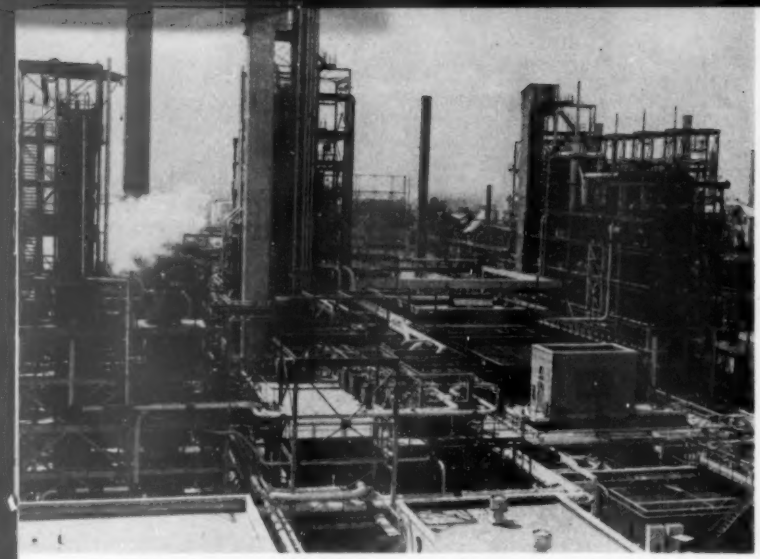
Obviously, the answers are not so forthcoming as the questions. Development of this newest oil-producing province has just begun. The discoveries to date have been restricted to small spots on the Nesson anticline in North Dakota and the Baker-Glendive-Poplar anticlinal trends in eastern Montana.

As has previously been stated, time may prove that about ½ billion barrels of oil has already been found by the past year's activity in the Williston basin. The chance of finding that much oil in any year to come appears slim.

The total ultimate recovery of oil in the Williston basin (as outlined in Fig. 1) has been estimated to be somewhere in the neighborhood of 2½ billion barrels. This estimate was reached through two approaches to the problem: (1) Applying an average ultimate recovery of oil per unit volume of sedimentary rocks with due allowance made for the as-yet unproductive post-Paleozoics, and (2) assigning an average recovery per acre to the number of acres that can be expected to become productive as indicated by statistics of petroliferous regions of the Mid-Continent, Illinois basin, and Rocky Mountain areas.

Production forecast . . . Assuming that 2½ billion barrels of oil will ultimately be recovered from the Williston basin, the next question is: At what rates will the oil be produced?

Producing rates are dependent on many unpredictable factors. However, barring a decided drop in demand for crude oil and its products or the opening of a more attractive area for exploration and development, the Williston basin can be expected to follow a pattern of development of reserves not unlike other oil provinces in the United States and Canada. As such, it is predicted that by the end of 1953 the crude available from the Williston basin will be somewhere around 25,000 bbl. daily. During the following year productive capacity will be somewhere between double and triple this amount —sufficient to make it feasible to build pipe lines out of the area. Within 10 years from now production should be pushing 200,000 bbl. daily.



COMBINATION crude-distillation and cracking unit is subjected to scheduled shutdown each 3 to 4 months. Through well-organized prior planning and on the job scheduling of inspection and repair work, the turnaround has reached a high degree of efficiency.

TURNAROUND . . .

. . . of a combination unit

by George Weber
Refining Editor

IN recent years much attention has been devoted to the methods employed in inspecting, cleaning, and repairing large catalytic cracking units during shutdown periods. Less spectacular but of equal importance are the frequent turnarounds of thermal cracking plants. Here is an example of a typical job of this type as carried out by Standard Oil Co. (Ind.) at its Whiting refinery.

The unit concerned is a combination plant rated at 25,000 bbl. per day crude oil input with light and heavy gas oil cracking and reduced crude coking. Three furnaces serve the unit. One dual furnace handles crude and heavy gas oil, a second runs light gas oil including 3,000 bbl. per day from other sources, and the third, two-coil furnace charges parallel streams of reduced crude. Distillation units include a crude tower, a high-pressure evaporator and bubble tower for light gas oil, and a low-pressure evaporator and tower for heavy gas oil. The coking section comprises four coke drums equipped for hydraulic decoking. The combination unit is served by 48 individual exchangers and 54 pumps.

The unit is shut down on schedule from three to four times yearly. Built in 1937, it recently underwent its forty-sixth turnaround. As a result of the frequency of turnaround and the complete records kept on all such operations, shutdown of the combination unit, designated No. 370, has become well organized and highly efficient.

The process department tentatively schedules shutdowns about 6 months in advance. This preliminary date is checked with the mechanical division which coordinates its down period with those of other process units in the 208,000-bbl. per day refinery.

Shutdown Coordination

The actual time of unit shutdown is continually narrowed, until about 2 weeks in advance, when the day and the hour are fixed. By this time, the process department has completed compiling a long, detailed work list, which notes all the individual jobs to be done during the down period. In addition to the routine inspection and cleaning, it notes all equipment due repair or replacement, and notes specific unit sections which receive special attention in periodic rotation.

For handling general routine and maintenance work the refinery is divided into five zones. One zone supervisor is in charge of the work in each zone, and he is assisted by two or three foremen in charge of certain areas within the zone. The shutdown coordination group consists of about 12 men who handle shutdown work on all of the major process units in the refinery. The man in charge of this group will be referred to as the shutdown coordinator.

On the larger unit shutdowns the shutdown coordinator is in charge of the work. He is advised on matters peculiar to that particular unit by the zone supervisor for the zone in which the unit is located. Other members of the shutdown coordination group are used as field coordinators on various sections of the unit, to keep man-hour records for the individual jobs, and to coordinate transportation of equipment between the unit, shops, and storehouse. On the smaller-unit shutdowns, some of which occur at the same time as shutdowns on the larger units, the zone supervisor is in charge of the work, and he is assisted by one or more members of the shutdown coordination group. Depending on the size and complexity of the unit, and on the number of shifts worked, from one to eight members of the shutdown coordination group may be used on a shutdown.

In the case of the unit under discussion, about 2 weeks before the scheduled shutdown date, meetings are held to plan the work. These meetings are called by the shutdown coordinator and are attended by an assistant superintendent of the mechanical division, a foreman from each craft involved, an inspector, and an operating-department representative.

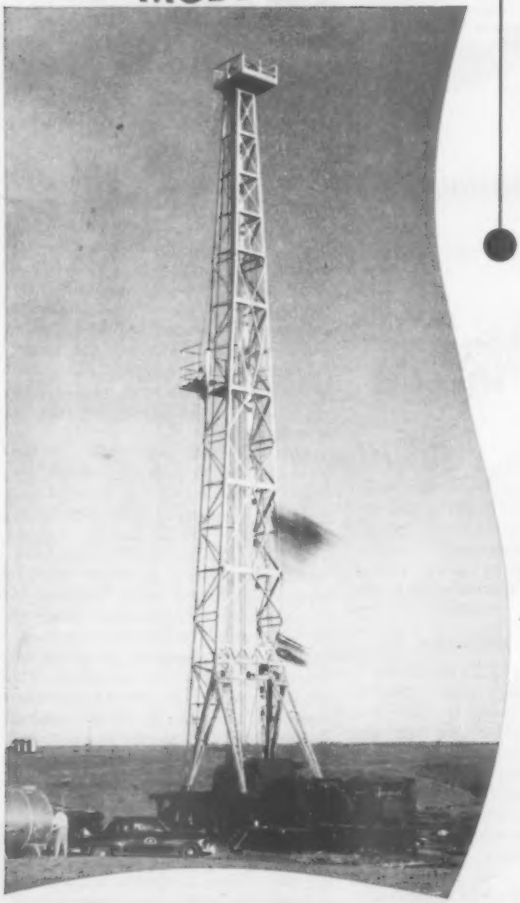
From the work list supplied by the process department, the shutdown coordination group draws up its estimated manpower requirements for each craft, by day and by shift for the first 3 days. The third day of such a shutdown usually shows peak manpower requirements. That day's labor estimate is then used as the basis for obtaining the first week's manpower allocation. This allocation appears in a special shutdown section of the mechanical division's weekly manpower schedule. Authority to draw on the mechanical division for labor up to the estimated maximum provides the shutdown group the priority it needs to meet all foreseen manpower requirements. Day-to-day adjustments are possible as the shutdown progresses, and the planners generally keep 2 or 3 days ahead in placing their firm manpower requests as indicated by preliminary inspection of the unit as it comes down.

Daily meetings of the coordinating group begin with the shutdown, and

LEE C. Moore

CANTILEVER MASTS

THE MODERN WAY TO DRILL TO ANY DEPTH....



Lee C. Moore Masts are easy to move and erect. The variety of sizes makes it possible for you to select the one you need. There is a correct size for depths to more than 15,000 feet. Wherever oil is found Lee C. Moore Masts have proved to be the efficient, modern way to drill to any depth.

LEE C. MOORE CORPORATION

TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT • WICHITA • CENTRALIA • PITTSBURGH

Export Office — Room 624, International Bldg., 630 Fifth Ave., New York 20, N. Y.

"Detailed records necessary for planning subsequent turnarounds."

changes in the over-all plan can be instituted smoothly. Big units are broken down into sections, each under a field coordinator. The combination unit is divided into three sections: high-pressure units, low-pressure units, and ground units which include furnaces. Progress reports are made at the daily meetings by craft foremen and the three field coordinators, to make certain that no jobs lag behind schedule.

This means of coordinating work on the job, rather than by detailed paper planning prior to shutdown, requires experience. But it affords much flexibility and provides good training for all men involved.

In particular, it aids in developing good craft foremen and crews. For example, the group uses the work list as a basis for drafting individual work orders by craft and job. The field coordinators distribute these work orders to the respective craft foremen a day before the specific jobs are to be begun. No attempt is made to outline the day-by-day duties of craft units. This planning is left to the initiative of the foreman himself. Past experience with this policy at Whiting has proved that such individual jobs are best expedited by foremen in direct charge.

Bottlenecks

The average combination unit turnaround requires from 10 days to 2 weeks of regular working days. Most of the work is done in two shifts per day.

Some of the jobs require the full shutdown period to complete and thus become the controlling factors in the turnaround organization. Top priority is generally given to tower work. On each shutdown, certain tower sections are selected in rotation for subjection to a thorough inspection and cleaning. This involves removal of trays, sandblasting, detailed inspection, repair, and replacement. Since a limited number of men can work in these restricted areas, this phase of the operation is closely coordinated. When a crude-tower section comes up for such detailed work, the services of pipe fitters, tinners, insulaters, carpenters, boilermakers, welders, sandblasters, and general labor are required. This operation may require from 500 to 2,000 man-hours of labor, not including inspection which is handled by trained engineers. Tower work is carried on through all three shifts during the shutdown period.

Second priority is generally given to cleaning and inspection of exchangers and condenser boxes, either of which could become a bottleneck. This work is done by two shifts per day, and the third shift may be brought in if the work appears to lag.

SHUTDOWN COORDINATION group meets regularly during a process unit turnaround to review progress of the work and to make certain that all phases of the operation are smoothly coordinated.

The coordinating group also watches the progress of work on pumps, and the cleaning and inspection of lines.

Steam and air are used to burn the coke from furnace tubes. Prefabricated connections assembled by pipe fitters admit plant air and steam to the furnace coils and discharge combustion gases to flue gas stacks. Manifolding provides for reversing flow through the furnace coils, to burn out the coke on the first few feet of section where the temperature was not high enough to remove coke during the initial operation. Unit operators take over this tube decoking work on a round-the-clock schedule as soon as connections are made up.

The engineering inspection department plays an important part in all unit shutdowns. Their work must be coordinated with that of the crafts who must open furnace tubes for calipering, dismantle certain lines, and provide access to towers and vessels.

Records

Detailed records of each shutdown provide important information for planning subsequent turnarounds. In the case of the combination unit, the complete history of all previous shutdowns permits the planning group to estimate its needs very closely.

Craft foremen turn in daily reports listing men employed in field and shop for each job order they receive. When the job is completed, the expanded work order showing total man-hours required by shift is returned to the coordinating group. These data are then posted to a job record card, which shows the same number as similar jobs on other turnarounds of the combination unit.

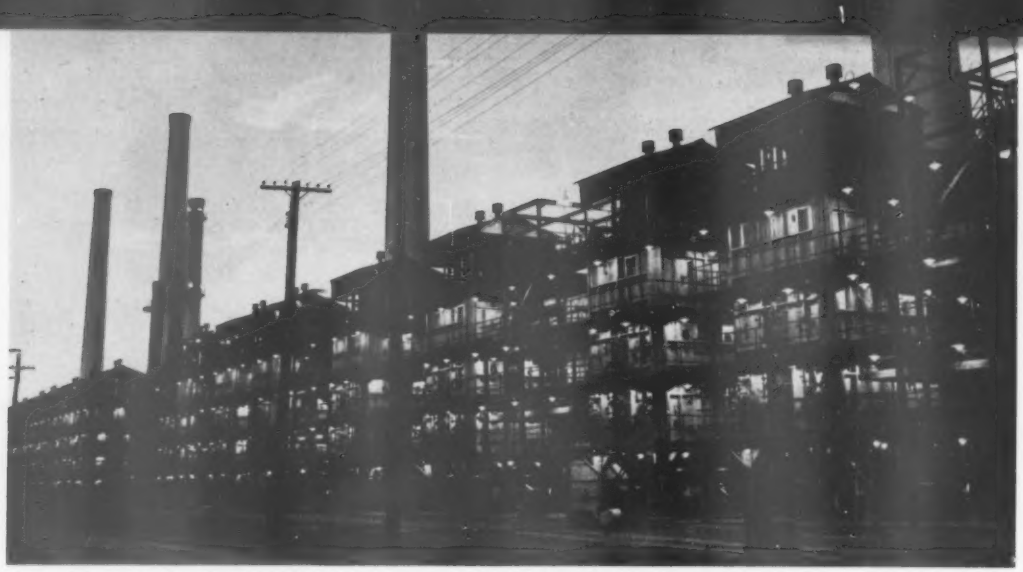
A final report is made to the mechanical and operating divisions on each shutdown. Separate from the report compiled by the engineering inspection department, this account provides a brief description of the work done and the man-hours required on important jobs. The report also summarizes man-hours required by craft and by type of work, and permits a comparison of field and shop labor requirements.

Data from the individual shutdown report are then posted to a comparison sheet which lists the pertinent figures for the latest six successive unit shutdowns. This sheet provides direct comparison of the following data on each shutdown:

1. Hours on stream during the prior intervening period between shutdowns.
2. Barrels of crude processed during the same period.
3. Operating efficiency during that period (per cent time on stream).
4. Length of scheduled shutdown in hours.
5. Average number of men required per 24-hour period during shutdown.
6. Maximum number of men required per 24-hour period during shutdown.
7. Shutdown man-hours devoted to repair.
8. Shutdown man-hours devoted to inspection (not including engineering inspection).
9. Repair man-hours per 1,000 bbl. of charge processed.
10. Repair man-hours per hour on stream.
11. Summary of all shutdown man-hours by craft.
12. Summary of all shutdown man-hours in field and shop.

This direct comparison permits supervisors to make important analyses of the efficiency of their shutdowns. It sometimes reveals instances of unnecessary work and allows some jobs to be brought more closely in line.

The shutdown coordination group handles about 50 shutdowns per year at the Whiting refinery. The total man-hours expended during these shutdowns are about 850,000.



THESE LARGE CONVERTERS are used to change natural gas and steam into hydrogen and carbon monoxide for the synthesis of methanol. Nylon and plastic intermediates are also manufactured at Orange.

PETROCHEM REPORT:

E. I. du Pont de Nemours & Co., Inc., Orange, Tex.

Company also has plants at Victoria, La Porte, and Stanton, Tex. Since 1945 company has expended more than half billion dollars to enlarge these plants

by F. Lawrence Resen
Gulf Coast District Editor

HEXAMETHYLENE diamine adipate (nylon, that is) is the end product toward which chemical intermediates are produced at two Texas petrochemical plants of E. I. du Pont de Nemours & Co., Inc.

The plant at Orange, the Sabine River Works and largest installation, utilizes natural gas, benzene, and cyclohexane to produce adipic acid and hexamethylene diamine, two prime intermediates in making nylon. In addition, the plant produces methanol, using natural gas as raw material, and polythene resin, which have a starting base in ethylene.

The Victoria plant processes butadiene and natural gas to produce adiponitrile, another prime nylon intermediate. This, in turn, is transshipped to Orange where it is processed into the hexamethylene diamine. The adipic acid and the diamine produced at Orange are then transshipped to East Coast plants where they are processed into the final nylon polymer used for a wide variety of industrial and consumer applications.

Du Pont has two additional plants in Texas. One of them is the La Porte plant, which uses petrochemicals to synthesize a variety of agricultural and industrial chemicals. The fourth plant is a small installation at Stanton for the manufacture of nitroglycerin.

The extent to which Du Pont has expanded its petrochemical facilities in the Gulf Coast may be seen in the 550 million dollars spent on the three plants since 1945. Texas ranks fifth among the states in terms of the company's plant investment.

Nylon development . . . One of the most interesting developments in high-polymer chemistry has been that of nylon. The discovery was made public in 1938 after research work conducted under the direction of the late Dr. Wallace H. Carothers. At that time, coke was a principal raw material. However, as continued research was conducted, the utilization of petroleum came into being and the prime constituents of the polymer may now be commercially obtained from oil and gas, including benzene, cyclohexane, hydrogen for hydrogenation, and ammonia.

The synthesis of nylon is quite interesting in that adipic acid made early in the process is further processed to hexamethylene diamine. This diamine is then combined with additional adipic acid to form the long chain nylon polymer.

Nylon synthesis . . . Several of the intermediate chemicals used in the synthesis of nylon may be obtained from various sources, i.e., cyclohexane used in the production of adipic acid may be obtained by the hydrogenation of benzene or it may be obtained directly from petroleum sources. Keeping this in mind, general steps in the synthesis of the polymer will be herewith outlined. (See box).

Benzene, obtainable from petroleum, is initially hydrogenated to cyclohexane. By an oxidation process the hexane is converted to adipic acid. Ammonia is combined with the acid to form ammonium adipate, which is condensed in two successive reactions to adipamide and adiponitrile. The nitrile is then hydrogenated to the hexamethylene diamine which when polymerized with ad-

ditional adipic acid forms the nylon polymer.

At the Sabine Works, natural gas is used as a source of hydrogen for the hydrogenation of benzene and adiponitrile. Hydrogen is also necessary in the production of ammonia. At the Victoria plant, a different process is used for the production of adiponitrile, which utilizes butadiene and hydrogen from natural gas in the synthesis of the intermediate.

The hexamethylene-diammonium-adipate is actually the nylon salt which in dry form is a white crystalline material that looks much like ordinary table salt. To facilitate its handling, it is dissolved and transported by tank cars to nylon flake and yarn plants at Seaford, Del.; Martinsville, Va.; and Chattanooga, Tenn.

Nylon yarn . . . At the textile fiber plants, nylon salt solution is piped to the top of the building to evaporators, where much of the solvent is removed to leave a highly concentrated solution remaining. The salt solution flows into an autoclave, where under the influence of heat, polymerization takes place.

When polymerization has been completed, the thick syrupy material flows from a slot in the bottom of the autoclave onto the surface of a broad, slowly revolving casting wheel. A spray of water hardens the nylon polymer into a translucent milky white ribbon, which is then chopped up into small flakes. The nylon flakes from several autoclaves are blended and poured into spinning machines to make yarn.

A hot grid at the bottom of the machine melts the flakes and a specially designed pump forces the viscous molten nylon through numerous fine holes of a spinneret to form the yarn filaments. The yarn is later stretched or drawn to increase its strength.

Sabine works . . . At the Orange plant, methanol and polythene resins are produced in addition to the nylon salt intermediates. Natural gas is converted into carbon monoxide and hydrogen by reacting steam over a catalyst. By high-pressure synthesis, carbon monoxide and hydrogen are made into methanol. Some of the carbon monoxide and hydrogen, by another reaction, is converted into gases used in making a chemical employed in the nylon intermediate plant.

Ethylene gas is polymerized by a complex, high-pressure process in making the "Alathon" plastic materials.

Plant personnel at Orange include: D. D. Campbell, plant manager; R. H. Carnally, maintenance superintendent; M. A. Warner and Dale Walsh, assistant superintendents; M. R. Hoff, chief chemist; Paul Vandervort, assistant chemist; P. S. Scaff, mechanical superintendent; and M. G. Hyatt assistant mechanical superintendent.

La Porte plant . . . Raw materials used at the La Porte plant include methanol from the natural-gas process, benzene from the petroleum industry, sulfur, and ethylene diamine. These are processed to produce several organic chemicals as well as agricultural chemicals.

GAS-PURIFICATION UNIT at Sabine River Works is used in the refining of ethylene.

Products at La Porte include acetic anhydride, benzene hexachloride, hexachlorobenzene, phenothiazine, and various agricultural chemicals known by trade names as Fermate, Marlate, and Zerlate.

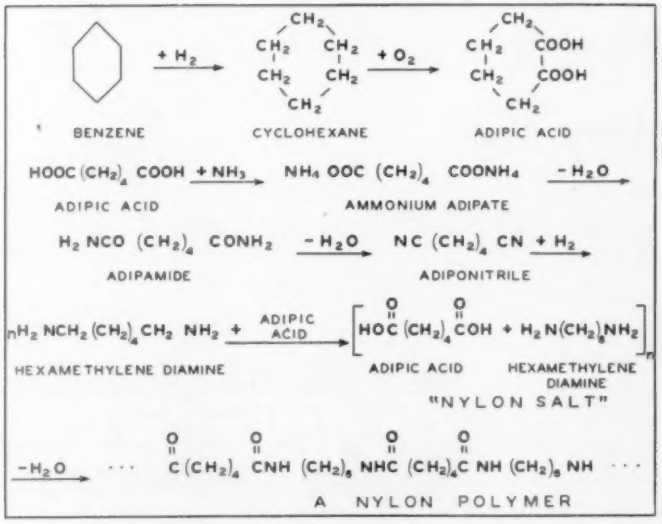
Plant personnel at La Porte include: M. C. Sperry, plant manager; L. G. Knight, maintenance superintendent; W. A. Benton, assistant superintendent; L. M. Swisher, chief engineer; and J. W. Langston, chief chemist.

Victoria plant . . . The Victoria plant specializes in the manufacture of the adiponitrile which is sent on to Orange for further processing. During the plant's construction, demand had increased so that it was necessary to begin doubling capacity before the original work had been completed.

Of interest there is a unique waste-disposal system, which will inject industrial wastes into a salt-water stratum. The wastes will first be treated to make them compatable with the underground conditions and then injected through a well into the particular salt water sand. *(The Oil and Gas Journal, September 27, 1951, page 53).*

Plant personnel at Victoria include: R. L. Schuyler, plant manager; A. B. Elliott, assistant plant manager; C. S. Oldach, technical manager; R. H. Lamey, plant engineer; R. F. Cockerill, production superintendent; R. S. Wangelin, Jr., service superintendent; and W. P. George, control superintendent.

The Chemistry of Nylon



CUSHION GRIP

. . . that never fails

MISSION
rolling dog rotary slips

The cushion grip of the exclusive Mission rolling dog principle insures a positive, INSTANT GRIP . . . a smooth, INSTANT RELEASE. Thus, Mission Rolling Dog Rotary Slips never cut or bottle-neck your pipe. Mission Rolling Dog Rotary Slips are easier and faster to handle, easier to service. Specify MISSION when you buy rotary slips through your Supply Store for any size or length strings.

MISSION MANUFACTURING CO.

HOUSTON, TEXAS
Export office: 30 Rockefeller Plaza, New York

TABLE 1

PAINT COLOR	CHALKING WHITE	NEW ALUMINUM	WEATHERED ALUMINUM	BLACK
POUNDS GASOLINE LOST	16-1/8	22-1/8	27-3/8	37-1/8
RATIO TO CHALKING WHITE	1.0	1.4	1.70	2.30

TABLE 2

	C-1 BLACK CONE	C-2 WEATHERED ALUMINUM CONE	C-3 WHITE CONE	L-1 WHITE LIFT ROOF
TOTAL AIR-HYDROCARBON VAPOR VENTED	2.0	1.7	1.0	0.2
TOTAL HYDROCARBON LIQUID VENTED AS VAPOR	2.4	1.9	1.0	0.2
LIQUID LOSS	2.4	1.8	1.0	0.5

TABLE 3

	C-1 BLACK CONE	C-2 WEATHERED ALUMINUM CONE	C-3 WHITE CONE
RATIO RELATIVE TO WHITE CONE	1.7	1.5	1.0
PER CENT TOTAL SOLAR HEAT ABSORPTION - BLACK CONE TANK AS REFERENCE	100 %	88.0 %	59.0 %

TABLE 4

	C-1 WHITE ROOF WEATHERED ALUMINUM SIDEWALLS	C-2 WEATHERED ALUMINUM ROOF WHITE SIDEWALLS	C-3 ALL WHITE
TOTAL AIR-HYDROCARBON VAPOR VENTED	1.6	1.2	1.0
TOTAL HYDROCARBON LIQUID VENTED AS VAPOR	2.0	1.3	1.0
LIQUID LOSS	2.0	1.3	1.0

Factors affecting

Conservation of Products In Storage

Studies here reported reveal that the most effective coating for the storage vessel is a white paint for the roof and the sidewalls

by S. S. Smith* and G. D. Harden†

RECENT data obtained by Shell Oil Co. indicate that storage tanks containing volatile products should be painted in entirety with white paint. Although initial paint cost is higher (compared with cost using aluminum paint), net savings amount to about $1,500 per year, due to the great reduction in evaporation losses.

If severe atmospheric conditions cause excessive corrosion, the best and most effective compromise is to paint the side walls white and the roof aluminum. This is the reverse of usually accepted practice.

Results presented in this report, plus those outlined in a previous paper,‡ represent the completion of the tankage paint study, with the exception that one more test is to be made to confirm the correlation between the small and large-scale studies already carried out.

Three-part study . . . The experimental work was divided into three parts as follows:

1. Evaporation losses from 50-gal. drums were determined. These drums were painted various colors, with each being painted one solid color all over. Each drum was half filled with gasoline, and was weighed daily to determine losses. Gasolines of various vapor pressure grades were used.

2. Evaporation losses from thousand-gallon tanks in a pilot tank farm were determined. These tanks were painted in various solid colors, and different grades of gasoline were used. The tanks were equipped with accurate measuring devices, for both liquid and vapor losses, and for amount of air intake.

3. One test was made on 80,000-bbl. cone-roof tanks, to verify the validity of quantitative data derived from the pilot-plant tank form. One additional test is scheduled.

Drum study . . . Twelve 50-gal. drums were painted, three each being painted chalking white, black, aluminum, and artificially weathered aluminum paint.

The 3-bbl. units were filled one-half full with 8.8, 12.1, and 13.8 R.v.p. motor gasoline, respectively. Each day the drums were weighed to within plus or minus ¼ lb. The total weight losses for the period of the test were used to develop loss figures relative to the chalking paint (Table 1).

Pilot Tank Study

In order to substantiate the drum data, initial investigation with the experimental tank farm started in the fall of 1950; its purpose was to determine product loss relative to a white cone

*Manager, products pipe-line division, and †engineer, Shell Oil Co. ‡1951 A.P.I. pipeline technology meeting, Shell report.

"Losses from aluminum and white paint . . . 1.5 times all white."

tank for a weathered aluminum cone roof tank, a black cone tank, and a white lift roof tank having a lift capacity equal to 28.5 per cent of the volume of the tank.

Evaporation . . . The tank farm is built around tanks having 1,000-gal. shell capacity, and consists of three cone roof tanks and a lift roof tank. Each tank is located on a chat pad and calibrated with water using Bureau of Standards calibration cans. The tanks are fitted with gage glasses for liquid measurement and positive displacement gas meters to measure the venting and breathing action in the vapor phase. Thermocouples are installed by which continuous readings can be made for liquid and/or vapor temperatures. The model tanks were filled one-half full with 13 to 14-lb. R.v.p. gasoline, and evaporation losses were noted. The results of this study are summarized in Table 2.

Air movement . . . Supplementing this study of evaporation, the tanks were emptied, gas freed, and filled with air so that the metered measurements of the breathing and venting action were a direct index of the amount of solar heat absorbed and radiated by each color of tank paint. The relative ratios of the breathing action of the tanks filled with atmosphere are noted in Table 3.

Comparing these two initial investigations, it is noted that while there is the same order of difference in the relative effects of heat absorption by the black, aluminum, and white coatings, the magnitude of the difference in the study including both liquid and vapor phases is greater than in the study with air alone. In the single phase air study, the relative ratios decreased from 1.8 to 1.5 for weathered aluminum and from 2.4 to 1.7 for black paints respectively.

This decrease of relative factors for the single phase air study, is attributed to the elimination of heat absorption by a liquid phase with its attendant vapor expansion. These losses are those which result from changes in vapor pressure and are additive to the breathing losses. It is apparent that this latter effect contributes almost as greatly to the total venting and breathing action of the storage tank as does the natural thermal contraction and expansion of the vapor.

These facts being recognized, another study was initiated in which the relative losses from an all-white cone tank were compared with a cone roof tank having a white roof and aluminum sidewalls. The losses from the aluminum and white tank were 1.5 times the loss from the all-white tank. Comparing the 1.5 ratio with the 1.7 relative ratio previously developed for an all-aluminum tank, it is found that painting the roof white, insuring a high degree of reflectivity, reduces the heat absorbed by the vapor, but it does not reduce commensurately the over-all volatile loss. This adds additional credence to the proposition that sidewall color is the major factor influencing the magnitude of the loss from motor gasoline storage.

TABLE 5

	C - 1 WHITE ROOF WEATHERED ALUMINUM SIDEWALLS	C - 2 WEATHERED ALUMINUM ROOF WHITE SIDEWALLS	C - 3 ALL WHITE
AVERAGE TEMPERATURE 4-IN. BELOW ROOF	60.5 °F.	63.4 °F.	56.2 °F.
AVERAGE TEMPERATURE VAPOR PHASE	58.2 °F.	57.0 °F.	52.0 °F.
AVERAGE TEMPERATURE 1-IN BELOW LIQUID SURFACE	50.1 °F.	46.0 °F.	46.0 °F.
AVERAGE LIQUID TEMPERATURE	45.5 °F.	42.0 °F.	42.0 °F.
ATMOSPHERIC TEMPERATURE	47.0 °F.	47.0 °F.	47.0 °F.

TABLE 6

	TIME PERIOD	NEW ALUMINUM PAINT	WHITE PAINT	RATIO ALUMINUM TO WHITE
VOLUME H. C. VAPOR VENTED FT.³ 60 °F. 760 MM. HG	9/24 TO 10/6/51	193 334 FT.³	148 010 FT.³	1.3
AVERAGE PER CENT EXPANSION VAPOR PHASE	9/24 TO 10/6/51	6.4 %	4.7 %	1.4
AVERAGE GALLONS PER 1000 FT.³ VAPOR	9/23 TO 10/3/51	10.0 GAL./1000 FT.³	7.9 GAL./1000 FT.³	1.3
BARRELS OF GASOLINE LOST AS VAPOR	9/24 TO 10/6/51	46 BBL.	28.0 BBL.	1.6
60 °F. BARREL LIQUID LOST (TANK GAGE)	9/24 TO 10/6/51	76.0 BBL.	59.0 BBL.	1.3
LIQUID LOSS DURING INITIAL TIME PERIOD HEAT ABSORPTION PERIOD	9/19 TO 9/23/51	350 BBL.	18.0 BBL.	1.9
OVER-ALL LIQUID LOSS	9/18 TO 10/6/51	11.0 BBL.	77.0 BBL.	1.4
PER CENT LIQUID LOST DETERMINED BY CHENICEK WHITMAN APPARATUS	9/24 TO 10/6/51	0.266 %	0.20 %	1.3

Temperature differences . . . The importance of the color of the shell of a storage vessel is also confirmed by the relation which exists between the temperature rise of the vapor compared to temperature rise of the liquid. In the work with the small tank farm, the temperature of the vapor increased 3° to 4° F. for each degree rise of the liquid temperature. This temperature relationship which is specific for the small tanks, indicates that the liquid phase absorbs 120 times the available solar energy absorbed in the vapor phase despite the fact that 60 per cent of the tank's surface area is in contact with the vapor phase.

This somewhat startling difference in the amount of heat absorbed by the two phases is due in part to the extreme differences between the heat conductivity coefficients for vapor versus liquid films and in part to the differences in the rates of heat transfer arising from the thermal convection currents which exist in the vapor and liquid phases of gasoline. The relatively high capacity of the liquid phase for absorbing heat in comparison to the vapor phase emphasizes again the need for a highly reflective paint for the sidewalls of a storage tank.

In order to demonstrate more clearly the relative effects of the solar energy which is absorbed and transmitted through the roof compared to the sidewall areas of a tank, a final study was initiated. The purpose of this was the development of relative loss factors for an all-white tank, a tank with white sidewalls and an aluminum roof, and finally a tank with aluminum sidewalls

and a white roof. The results, outlined in Table 4, show effects of the color of a tank's sidewall on the over-all loss picture.

Relative loss ratios of 1.6 for air vapor and 2.0 for liquid are shown for the tank with the aluminum sidewalls, C-1, which approach in magnitude the relative losses previously arrived at for a weathered all-aluminum tank. In sharp contrast are the relative ratios of 1.2 for vapor and 1.3 for liquid losses developed for the tank with the aluminum roof and white walls, C-2. These latter ratios indicate greater heat absorption by the aluminum surface, but, despite this energy absorption, they are comparable to an all-white tank and almost exactly match the relative loss factors assigned to a new aluminum finish before weathering.

Sidewall heat transfer . . . Another interesting contrast in the relative effects of the choice of color for a tank's sidewall and roof is found in a comparison of the vapor and liquid temperature for the three test tanks. The temperatures shown in Table 5 were taken from the data for the days having a maximum solar radiation. In line with the consistently high rate of heat absorption by a weathered aluminum finish, the greatest vapor temperature normally occurs just below the aluminum roof, tank C-2. However, comparing the over-all average temperatures for the respective tanks' vapor phases, it is noted that this temperature relation tends to reverse and the temperature for the tank with the white roof and aluminum sidewalls (C-1) is just slightly higher than the over-all temperature of the vapor phase under the aluminum roof (C-2). This result shows clearly the effect of convection currents generated by the aluminum sidewalls versus the insulating effect of the hot noncirculating vapor under the aluminum roof.

Another significant factor to be noted in the temperature analysis is found in the exact comparison of the liquid temperature for the two white sidewall tanks notwithstanding the fact that the temperature of the vapor phase directly below the aluminum roof is some 5° F. greater than for the all-white tank. Also worthy of note is the 3°-4° F. difference in liquid temperature which is recorded for the aluminum and white sidewall tanks.

Solar energy is available along the approximate horizontal plane of the roof and along the vertical plane of the tank's sidewalls. It is the energy transmission through the latter plane which accounts for the major portion of the heat energy which is converted to volatile loss from storage. The effectiveness of the sidewall transmission is a

". . . a net saving of $1500 per year per tank after chargeoff for paint."

function of high heat transfer coefficients and thermal convection currents which abet the transfer of available sidewall energy to the two phases of gasoline.

This absorption of sidewall energy reduces the stratification of heavy hydrocarbon vapors near the liquid vapor interface and augments the natural breathing and venting of the tank by the constant readjustment of the liquid's effective vapor pressure. In contrast, the transfer of energy downward from the roof area primarily affects only the thermal expansion characteristics of the vapor, and tends to be self-insulating.

Large Tanks

It must be conceded that the data from pilot plant tanks do not have tangible quantitative value and because of the diminutive size of the storage, there is reasonable doubt as to the applicability of the relative factors when projected to commercial storage. To dispose of any of these doubts it was undertaken to develop the relative loss relationship between two 80,000-bbl. cone roof tanks, one recently painted aluminum and the other all white. Both tanks were half filled with 40,000 bbl. of 10.5 R.v.p. gasoline of identical specification.

The two tanks were equipped with gas meters and recording thermometers for the measurement of the volume of breathing and venting. The mechanical vents on both tanks were sealed to insure that all vapor and air leaving or entering the tanks were measured by meter.

Since a cone roof tank is, in point of fact, a storage vessel for two phases of gasoline, an adequate picture of the relative effects of solar heat absorption necessitates the taking of data which will be a measure of the losses from both the liquid and the air-hydrocarbon vapor mixture. To meet this requirement, the following data were taken from each of the two 80,000-bbl. tanks for the period of the investigation:

Vapor phase:

1. Volume of hydrocarbon vapor vented, measured by positive displacement gas meters.

2. Gallons of liquid gasoline per 1,000 cu. ft. of hydrocarbon vapor, measured by the determination of the specific gravity of vapor samples and the conversion of specific gravity to liquid gallons per 1,000 cu. ft. of vapor.

Liquid phase:

1. Barrels of liquid lost, measured by float gage and the midpoint temperature of the liquid.

2. Per cent of liquid lost, measured by the analysis of liquid samples in the laboratory employing the Chenicek and Whitman vapor pressure apparatus.

The over-all time period covered in this study was September 18, 1951, to October 6, 1951. This period was divided into two parts, September 18, 1951, to September 23, 1951, inclusive and September 24, 1951, to October 6, 1951, inclusive. The first period was a period of heat absorption in contradistinction to the cooling and radiation observed during the second period. The relative loss developed for the two phases of gasoline are summarized in Table 6.

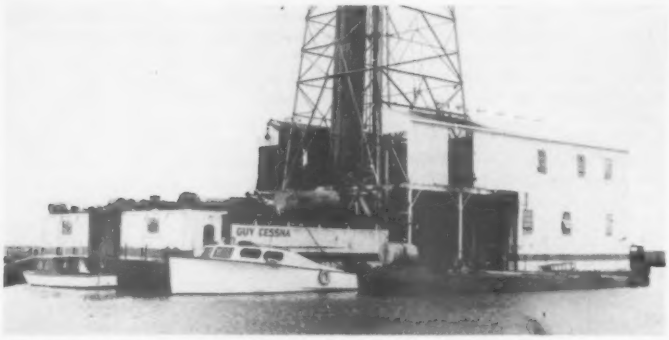
These results confirm the 1.3 relative ratio previously developed for a new aluminum finish and justifies the use of the ratio factors derived from experimental tank farm as a prognosis of the relative behavior of commercial storage.

Results

From these somewhat involved studies sufficient information has been obtained to set forth recommendations which are basically essential to the establishment of a sound product conservation program. It is obvious throughout this work that the magnitude of the venting and breathing action, entailing a daily loss of product, is a direct manifestation of the amount of solar energy absorbed by the vapor and liquid phases of the storage product. The roof and the sidewalls of the tank provide the media for the absorption and direct transmission of solar heat; however, due to the differences in heat transfer characteristics and the relative effects of energy absorption within the two phases of gasoline, the sidewalls of a storage vessel transmit the major portion of the energy which is dissipated in volatile losses from storage.

Control of solar energy absorption obviously rests with the choice of the color of the protective coating assigned to the storage vessel. The most effective coating for the control of losses is a white paiut for the roof aud sidewalls.

The extra cost of white paint, assuming half the life for white paint as compared to aluminum, is perhaps $200 to $250 per year on a 3-year recoat basis for a typical 80,000-bbl. tank. By conservative use of the data in Study 1 the losses sustained under aluminum exceed those under white paint by perhaps 350 bbl. per year for the typical 80,000-bbl. tank. This represents $1,750 per year in losses for motor gasoline, and retains a net saving of $1,500 per year per tank after charge off of additional paint cost.



RIG ON LOCATION at 1 Cockerell during fishing and repair operations was John W. Mecom's No. 5 barge. Location of the well was in Plaquemines Parish, 8 miles south of Port Sulfur, La.

Ingenuity Pays Off

Use of 72-in. casing to effect repairs on broken conductor pipe saves 10,000-ft. hole in South Louisiana marsh country

F. Lawrence Resen

OIL-FIELD ingenuity came in for a real "working out" on a well being drilled in South Louisiana by John W. Mecom, independent Houston oil operator, for the account of Freeport Sulphur Co. and Mecom.

When the well was nearly drilled, the string of surface pipe broke 93 ft. below the surface, then shifted and jammed so as to offset efforts to conduct repair operations from the rig floor. Failure to repair the pipe would have resulted in possible abandonment of the 10,000-ft. hole, or at best the drilling of another directional hole close by, plus the loss of 3,000 ft. of 10¾-in. surface pipe.

It was after repeated failures that Max Prather, drilling superintendent for Mecom, devised a plan:

Why not sink a large casing—72-in. i.d.—around the surface and conductor pipe and then lower men into the casing to repair the break?

It worked, but not until the crew had literally dug their way to the defective spot in the surface string.

How it started . . . It all began when circulation was lost at 10,108 ft. on 1 Cockrell, in Plaquemines Parish, 8 miles south of Port Sulfur, La. Immediate thought was that circulation was being lost through a formation in the open hole somewhere below the 2,951.8-ft. string of 10¾-in. surface pipe, and a testing procedure was carried out to determine the point of no returns. Tests were naturally begun at the bottom of the hole and subsequently carried upward until the break at the 93-ft. level was determined.

The surface pipe was enclosed within 16-in. conductor pipe set to 176 ft. with cement having filled the annulus between the two pipes. The immediate effort was directed toward getting a cutting tool below the break in the 10¾-in. pipe. Had this worked, the surface pipe would have been cut off below the break, the defective pipe removed, and a patching tool set on top of the remaining pipe so as to receive new sections of surface pipe.

Initial efforts . . . A rotary shoe was attached to a length of 13⅜-in. casing and a try was made to wash out the cement between the two pipes by running tool down the annulus between the two strings. However, the clearance between the two pipes was so slight that the tool was constantly shifting and gouging the 16-in. pipe. The rotary shoe finally reached the 103-ft. mark and the 10¾-in. surface pipe was cut at this point and removed from the hole. However, a jagged piece of 16-in. pipe, cut by the rotary tool and resembling a trough, was also pulled from the hole.

Difficulties were further increased since a small portion of the 16-in. pipe had dropped down into the hole and fell into the open end of the 10¾-in. pipe in the shape of a cone. At this time, the 10¾-in. pipe also shifted and the combination of this, plus the remnant of 16-in. pipe, succeeded in thwarting all succeeding efforts to use the rotary shoe. Each time the shoe would approach the surface pipe, the 16-in. remnant would cause it to sidetrack and solid cores would be obtained from the surrounding formation.

Prather's plan . . . After it became impossible to wash out the annulus with the rotary shoe, due to sidetracking, Prather hit upon the scheme to dig down to the break and lower men into the hole to make the necessary repairs. His decision to have 72-in. i.d. steel casing fabricated was based on dual reasoning, the foremost being a safety measure dictated by the marshy terrain.

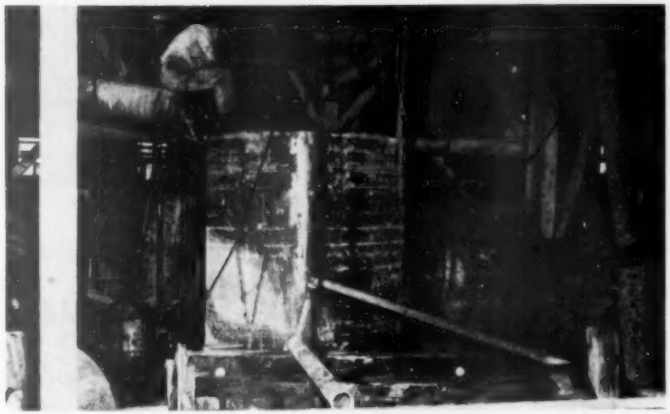
Had the well been drilled in solid ground, it would have been a simple matter to use timbers to shore up the sides of a 6-ft. shaft which could have been dug to the break. However, the marshland is constantly shifting and the danger of a collapse would have been imminent throughout the operation if timbers had been used.

In addition to serving as a bulwark against the surface formations while men were working in its interior, the casing was also intended to serve as a conductor pipe once the break had been repaired. In replacing the 16-in. line the large casing afforded considerable stability to the upper extremities of the well.

How it was done . . . The 72-in. i.d. casing was specially rolled from plate steel at Alexander Shipyards in New Orleans and shipped to the rig in 20-ft. sections. At first, the casing was alternately jetted and pulled down around the conductor string. Procedure followed was to weld eyeholes around the circumference of the casing and use a combination of snatch blocks and the traveling block on the rig to apply a downward force on the casing.

At the same time, a 10¾-in. pipe, with a 4-in. line running alongside and upending into the lower opening of the pipe, would be placed at various positions alongside the inner periphery of the casing. A salt-water supply was connected to the mud pumps and these pumped salt water through the 4-in. line to jet the washed-out formations to the slop pits at the surface.

By changing the position of the jet and 10¾-in. line, the formation would be loosened within the casing and the



SEVENTY-TWO-INCH casing in position. Note member of drilling crew perched on top left of big 72-in. pipe, guiding the 10-in. used as a salt-water jet.

downward pull would force it further into the earth. After each 20-ft. section would be lowered, a succeeding one would be welded to the uppermost section and the pulling procedure repeated. The welding of each section required approximately 8 hours.

The operation was successful except for a few hard-clay strata and for the last 30-40 ft., when the formation became hard. Then it was necessary to rig a "bosun's" chair and lower roughnecks into the casing with picks and shovels, and the hole had to be actually dug. A continuous air supply had to be provided whenever men were working within the casing.

The 72-in. casing was set to 103 ft. in the foregoing manner. At this point the 10¾-in. casing was cut in two by torches to provide a clean end. A collar reamed halfway through was then slipped over the pipe and welded in place. Other 10¾-in. pipe was then made up into the threaded half of the collar. The annulus between the 7-in. and 10¾-in. casing was filled with shell and concrete and the drilling of the well was resumed.

Interestingly enough, during the 30 days consumed in locating the break and the final repairing of the conductor pipe, the 7,000 ft. of open hole below the surface pipe remained clear and it was possible to resume drilling at the exact depth where circulation had been lost. Four days were necessary for setting the 72-in. casing and repairing the break.

Good producer . . . The time consumed in the successful repair of the surface pipe was worthwhile for the deeper drilling of the well resulted in the discovery of deep gas-distillate production on the north flank of the Lake Washington dome. The well was completed as a gas-distillate producer through perforations from 11,872-11,938 ft. with tubing pressure at 3,050 psi.

Seven-inch casing was set to a total depth of 12,022 ft. B. C. Rucker, toolpusher, supervised the entire job.

New Tubing Head

It permits bomb run into pumping well; saving cited

A NEW, modified tubing head has been designed to allow passage of a 1¼-in. o.d. bottom-hole pressure gage. This permits continuation of bottom-hole pressure surveys by utilizing the annulus of pumping wells. Moreover, this practice eliminates the necessity and expense of pulling tubing and rods, and of taking a well off production.

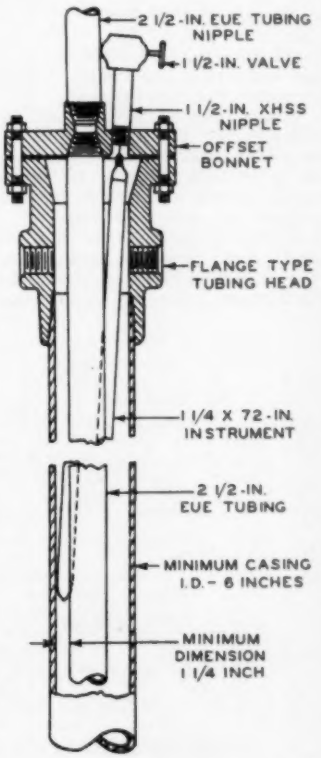
The tubing head design shown provides for an economical conversion of well-head equipment for annulus surveys at varied well-head pressures. Annulus-survey techniques provide a practical, low-cost method of obtaining accurate reservoir data by bottom-hole survey regardless of the accessibility of the tubing string.

Economics . . . Use of the modified tubing head in converting well-head equipment for 28 wells in the 1951 annual survey of the Tensleep reservoir at Elk Basin, Wyoming, fields resulted in a savings of $6,500. Elimination of this well-pulling expenditure amounted to 80 per cent of the cost required to convert wells for conducting annulus surveys with bottom-hole pressure gages.

Design . . . Despite the minimum clearance offered by 6⅝-in. 20-lb. casing (6.049-in. i.d.) with 2½-in. tubing in the hole, it was possible to design a tubing head with sufficient clearance to prevent fouling of a 1¼-in. instrument. It was possible to offset the tubing only 5/16-in. from the center and still allow sufficient clearance to allow the gage to pass between the tubing and casing at all points.

George H. Reneau, senior petroleum engineer, Stanolind Oil & Gas Co., Tulsa, designed the tubing head while he was field engineer at Cody, Wyo., during 1948-52. He made a thorough study of its performance and application to Elk Basin field surveys, with the assistance of John E. Lang, present district engineer at Cody.

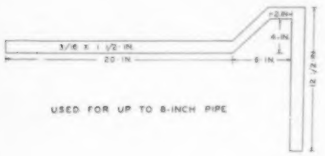
The equipment was described in a paper presented at the 1952 spring meeting of the Rocky Mountain district, Division of Production, American Petroleum Institute, Casper, Wyo.


2 1/2-IN. EUE TUBING NIPPLE
1 1/2-IN. VALVE
1 1/2-IN. XHSS NIPPLE
OFFSET BONNET
FLANGE TYPE TUBING HEAD
1 1/4 X 72-IN. INSTRUMENT
2 1/2-IN. EUE TUBING
MINIMUM CASING I.D. - 6 INCHES
MINIMUM DIMENSION 1 1/4 INCH

Here are two ideas which result in savings of money and work

SINCLAIR REFINING CO., Houston, is saving money and cutting maintenance work by use of two practoical ideas, which can in all probability be adapted to your own particular needs.

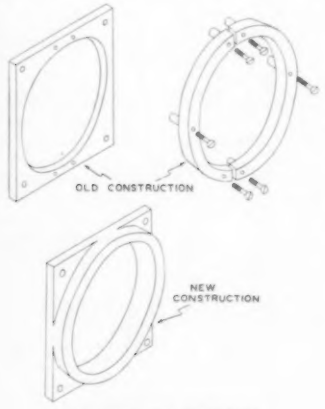
Flanges . . . The problem of insuring that flanges are square when welded to pipe sections has been solved by use of bar steel formed into a shape roughly resembling a hoe (see diagram).



FLANGE BAR

A long length of the bar is used for laying parallel with the pipe. Bar is formed so as to clear the flange, and so as to have another long length running parallel to the flange, and thus perpendicular to the pipe's length.

In aligning the flange the square is used just as a carpenter's square would be used, with its long length being held rigidly to the pipe and the flange being held snugly against the other length while welding proceeds.



WEAR-PLATE SUPPORT

Wear-plate support . . . Sinclair is now using a one-piece elevator footshaft wear-plate support on a T.C.C. unit at its Houston refinery. The changeover from three pieces results in longer wear, and makes bucket hangups less likely.

The support is used around the footshaft packing gland and slide-plate carrier on the catalyst elevator. With the three-piece support frequent breakage would occur, allowing catalyst to enter bearing boxes, causing oil lines to plug and a loss of power steam.

The original support consisted of a steel plate to which would be attached two halves of a split ring. The new construction (see diagram) incorporates the ring and plate as an homogeneous unit.

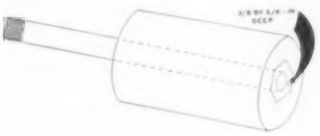
Threaded Rod Simplifies The Removal of Pistons

Removing a piston from a compressor cylinder can be a difficult and tedious chore. However, it can be simplified by use of a rod and a threaded hole in the piston-rod nut.

A hole to accommodate a ⅜-in. tap is drilled about ¾-in. deep into the piston-rod nut and is then tapped. A ⅜-in. rod, with threads on one end, is then screwed into the hole after the piston rod has been unscrewed from the crosshead. The piston may then be conveniently pulled from the cylinder.

Under previous conditions, when a compressor piston had to be removed from the cylinder, it was necessary to bar the engine over by hand one complete revolution after the piston rod had been unscrewed from the crosshead. This forced the piston approximately ⅔ of the way out of cylinder.

A pry bar was then used between the crosshead and the piston-rod nut to pry the piston the remaining distance. This method was awkward and tedious. In addition, the bar could slip or twist and thus damage the mechanical packing in the cylinder.

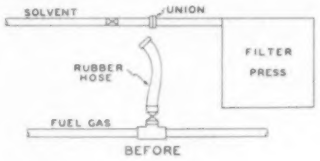


Use of the rod has made it possible to pull the piston from the cylinder without having to bar the engine and without the danger of damaging the piston-rod packing.

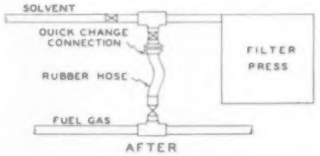
The method was suggested by Joe L. Liska, machinist helper for Humble Oil & Refining Co., Baytown, Tex.

Quick-Connecting Flue-Gas Fittings Used at Filter

A simple modification of the piping and fittings in the filter system at a Humble Oil & Refining Co. lube plant has eliminated a tedious and time-consuming task.



BEFORE



AFTER

In operating the filters at the M.E.K. lube plant, it is necessary to purge the solvent lines and the interior of the filters with fresh flue-gas prior to opening a filter. The attendant danger of the solvent leaking back through valves into the flue-gas system necessitated that the tie-in between the flue-gas and the solvent lines be of temporary nature.

Previously, whenever it was necessary to purge the solvent lines and filter shell, a union would be broken on the warm solvent line and a rubber hose running to the flue-gas system would be connected to the half-union on the filter side of the solvent line.

The process of disconnecting the solvent piping and connecting the rubber hose would necessarily have to be repeated in reverse to complete the operation.

A change was made which included the installation of a quick-change air connection with necessary fittings in the solvent line. The flue-gas system may now be easily and quickly connected and disconnected to solvent line.

The method was suggested by Alfred M. Sralla, pipefitter helper.

THE JOURNAL'S WEEKLY
Engineering Reference
SECTION

No. 14

PUMPS:

Part 14—Trouble Shooting

by Gerald L. Farrar
Engineering Editor

WHEN pump operation is faulty, these tables may be used as check lists to find the trouble.*

LOCATING TROUBLE IN CENTRIFUGAL PUMPS

No water delivered:

(a) Pump not primed.
(b) Speed too low.
(c) Discharge head too high.
(d) Suction lift higher than for which pump is designed.
(e) Impeller completely plugged up.
(f) Wrong direction of rotation.

Not enough water delivered:

(a) Air leaks in suction or stuffing boxes.
(b) Speed too low.
(c) Discharge head higher than anticipated.
(d) Suction lift too high. Check with gages. Check for clogged.
(e) Impeller completely plugged up.
(f) Not enough suction head for hot water.
(g) Mechanical defects:
  (1) Wearing rings worn.
  (2) Impeller damaged.
  (3) Casing packing defective.
(h) Foot valve too small.
(i) Foot valve or suction opening not submerged deep enough.

Not enough pressure:

(a) Speed too low.
(b) Air in water.
(c) Mechanical defects.
  (1) Wearing rings worn.
  (2) Impeller damaged.
  (3) Casing packing defective.
(d) Impeller diameter too small.

When direct connected to electric motors, check up whether motor is across the line and receives full voltage. When direct connected to steam turbines, make sure that turbine receives full steam pressure.

Pump works for a while and then loses suction:

(a) Leaky suction line.
(b) Waterseal plugged.
(c) Suction lift too high.
(d) Air or gases in liquid.

Pump takes too much power:

(a) Speed too high.
(b) Head lower than rating, pumps too much water.
(c) Specify gravity or viscosity too high.
(d) Mechanical defects:
  (1) Shaft bent.
  (2) Rotating element binds.
  (3) Stuffing boxes too tight.
  (4) Waring rings worn.
  (5) Casing packing defective.

LOCATING TROUBLE IN ROTARY PUMPS

No liquid delivered:

(a) Pump not primed.
(b) Suction lift too high. Check with a gage at the pump suction.
(c) Wrong direction of rotation.
(d) Clogged suction.
(e) Air leaks.
(f) Relief valve not properly adjusted or held off seat by foreign material.

Not enough liquid delivered:

(a) Air leaks in suction or through stuffing box.
(b) Speed below rated speed.
(c) Suction lift too high.
(d) Not enough suction head (for hot or volatile liquids).
(e) Foot valve or strainer too small or obstructed.
(f) Foot valve or end of suction pipe not immersed deeply enough.
(g) Piping improperly installed permitting air or gas to pocket in pump.
(h) Mechanical defects:
  (1) Pump damaged.
  (2) Pump badly worn.
  (3) Packing defective.
(i) Clogged suction.
(j) Liquid being pumped of viscosity greater than specified.
(k) Relief valve not properly adjusted or held off seat by foreign material.

Pump works for a while and then quits:

(a) Leaky suction lines.
(b) Suction lift too high.
(c) Air or gases in the liquid.

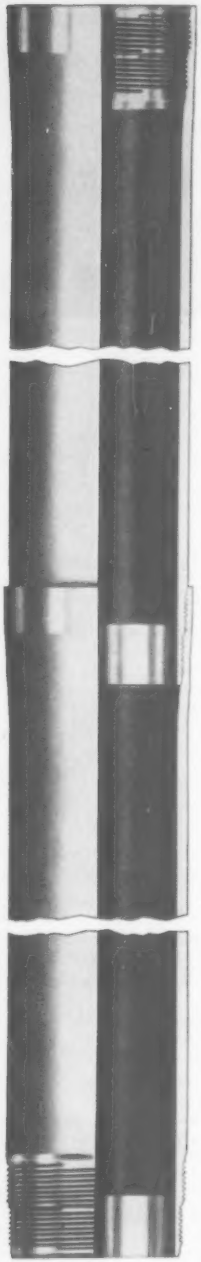
Pump takes too much power:

(a) Speed too high.
(b) Liquid heavier or more viscous than specified.
(c) Suction or discharge line obstructed.
(d) Mechanical defects.
  (1) Shaft bent.
  (2) Rotating element binds.
  (3) Stuffing boxes too tight.
  (4) Misalignment due to improper connection to pipe lines, or installing on foundation causing spring in casing or base.

Hammer:

(a) Air or gas in the fluid being pumped.
(b) Leaky suction lines.
(c) Too high suction velocity.
(d) Too many sharp changes in direction of suction line, coupled with too high suction velocity.
(e) Suction pipe not submerged deeply enough.
(f) Relief valve chattering.

*Tables taken from "Standards of the Hydraulic Institute," ninth edition, by permission of the institute.



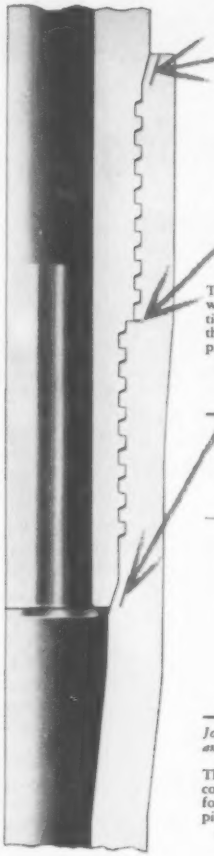
Here's the New HYDRIL Tripleseal CASING

THAT GIVES YOU

- **Increased Joint Strength**
- **Increased Joint Clearance**

PLUS

- **Three Pressure Seals**



The high-strength Tripleseal joint enables you to run longer oil strings of lighter weight casing than are possible with conventional threaded and coupled pipe. In addition to saving your steel, Hydril Tripleseal casing joints are nearly 5/16" smaller in O.D. than regular couplings, and the three precision pressure seals assure you of leak-proof performance.

Study the table below, then call the nearest Hydril sales office for complete information.

DIMENSIONS AND PERFORMANCE RATINGS

Casing, Size, Weight & Material	Performance Ratings (Tripleseal)		
	Setting Depth		Minimum Ultimate Joint Tension
	Collapse SF = 1⅛	Tension SF = 2	
	Feet	Feet	1000 Lbs.
5½—14# J-55	5,640	8,900	244
5½—15.5# J-55	6,860	9,380	288
5½—17# J-55	8,000	9,780	330
5½—17# N-80	10,470	11,140	376
5½—20# N-80	13,480	11,790	467
7—20# J-55	4,440	9,010	352
7—23# J-55	5,850	9,630	436
7—23# N-80	7,640	10,980	497
7—26# J-55	7,220	10,090	518
7—26# N-80	9,460	11,520	591
7—29# N-80	11,320	11,920	685

Joint Tension Strength is based on 55,000 Yield and 92,000 Ultimate for J-55 Material, and on 80,000 Yield and 105,000 Ultimate for N-80 Material.

The Tripleseal joint is applied to plain end casing by a Hydril-developed method of cold expanding one end of the pipe for the box thread and cold nosing the other end for the pin thread. This process efficiently distributes the metal in both the box and pin sections to produce high joint strength.

U. S. Patent 2,211,179 and Patents Pending.

Prompt Service

Facilities for cold forming and threading Hydril Tripleseal Casing Joints are available at the Hydril factories in Houston, Texas, Rochester, Pennsylvania, and Los Angeles, California.

HYDRIL COMPANY

GENERAL OFFICES: 714 WEST OLYMPIC BLVD., LOS ANGELES 15, CALIFORNIA

CALIFORNIA
Avenal
Bakersfield
Los Angeles
Ventura

CANADA
Calgary

LOUISIANA
Harvey
New Iberia

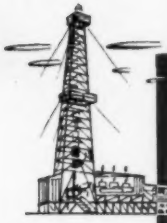
OHIO
Youngstown

OKLAHOMA
Tulsa

PENNSYLVANIA
Rochester

WYOMING
Casper

TEXAS
Corpus Christi
Dallas
Houston
Midland
Odessa



Oil-Well Cementing Materials—3

by C. D. Saunders* and F. W. Nussbaumer*

SOME of the additives which enhance the desired properties of oil-well cements were discussed in the last installment. This subject is further expanded here.

Expanded Perlites

Expanded perlite is made by the expansion of certain volcanic ore, forming a cellular product of extremely low weight. The raw volcanic ore is crushed and graded to a predetermined size and passed through a kiln where the temperature is raised to the fusion point of the ore. When the fusion point is reached the combined water in the ore expands producing a cellular product in much the same manner that popcorn is popped. This is then cooled and is the material sold as expanded perlite. The dry bulk weight of most expanded perlites now being used in oil-well cements is approximately 13 lb. per bulk cubic foot.

Perlite, due to its cellular, thin-wall structure, breaks down under pressure in a fluid medium allowing the fluid to penetrate and saturate the interior of the particle. This action takes place without appreciably changing the size of the individual particles. Since each particle can be saturated in this manner, it is possible to "tie up" considerable amounts of water with each cubic foot of perlite. Laboratory tests have indicated that each cubic foot of perlite (weighing 13 lb. per cu. ft.) requires approximately 4 to 4½ gal. of water to wet the surfaces and to completely saturate all particles under pressure.

When mixtures of perlite and cement are mixed with water, the perlite particles tend to float because the unsaturated density is less than that of water. The addition of 2 to 6 per cent bentonite in the cement greatly reduces this flotation and produces a slurry in which the perlite remains in much better dispersion throughout a cementing job.

The addition of bentonite and perlite to cement, plus the amount of water required to satisfy these materials, produces low-density slurries yielding more volume per sack of cement. These slurries set with less strength than does neat cement, thus affording better gun-perforation characteristics.

Properties . . . The properties of perlite - cement slurries containing bentonite are given in Table 1. As with all cementing materials, there are maximum and minimum water-cement ratios for obtaining the most satisfactory slurries. The amount normally recommended is the mid-point between these limits.

TABLE 1—PHYSICAL PROPERTIES OF PERLITE-PORTLAND (A.S.T.M. TYPE I) CEMENT SLURRIES

Per cent Bentonite	Water ratio, gal. per sack	Properties of slurries at Atmospheric pressure: Slurry weight, lb. per gal.	Atmospheric pressure: Slurry volume, cu. ft. per sack	3,000-psi. pressure: Slurry weight, lb. per gal.	3,000-psi. pressure: Slurry volume, cu. ft. per sack	24-Hour compressive strength (Cured at 100° F. and 3,000 psi.)
I. One Cubic Foot (1 Sack) Cement—½ Cu. Ft. Perlite						
2	6.5	13.8	1.52	14.9	1.41	
2	7.5	13.4	1.65	14.3	1.54	
2	8.5	13.0	1.78	13.8	1.67	
4	7.5	13.4	1.66	14.3	1.55	
4	8.5	13.0	1.79	13.9	1.68	
4	9.5	12.7	1.93	13.5	1.82	
6	8.5	13.1	1.80	13.9	1.69	
6	9.5	12.8	1.94	13.5	1.83	
6	10.5	12.5	2.07	13.2	1.96	
II. One Cubic Foot (1 Sack) Cement—1 Cu. Ft. Perlite						
2	9.0	12.3	2.00	13.7	1.79	1,950
2	10.0	12.0	2.14	13.4	1.93	1,500
2	11.0	11.8	2.27	13.0	2.06	1,050
4	10.0	12.1	2.15	13.4	1.94	1,600
4	11.0	11.9	2.28	13.1	2.07	1,200
4	12.0	11.7	2.41	12.8	2.20	800
6	11.0	11.9	2.29	13.2	2.08	1,300
6	12.0	11.7	2.43	12.9	2.22	1,100
6	13.0	11.5	2.56	12.6	2.35	850
III. One Cubic Foot (1 Sack) Cement—1½ Cu. Ft. Perlite						
2	10.5	11.5	2.36	13.3	2.04	
2	12.0	11.2	2.56	12.9	2.24	1,050
2	13.0	11.1	2.69	12.6	2.37	800
4	11.5	11.4	2.50	13.0	2.18	1,170
4	13.0	11.2	2.70	12.6	2.38	740
4	14.0	11.0	2.84	12.4	2.52	600
6	12.5	11.3	2.65	12.8	2.33	
6	14.0	11.0	2.85	12.4	2.53	800
6	15.0	10.9	2.98	12.3	2.66	700

*Halliburton Oil Well Cementing Co. Summary of paper presented at A.P.I. production meeting, Mid-Continent district, Wichita, March 19-21.

Knowing the Language of the Trade...

is important in the marketing of petroleum products

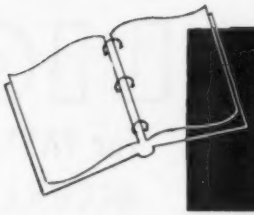
Many years experience in marketing petroleum products has taught us the language of the trade—a language that translates your problems into profit. Yes, you can look confidently to Beacon for assistance whether you are buying or selling petroleum products.

BEACON PETROLEUM COMPANY

HOUSTON • TULSA • ATLANTA

MARKETERS OF NATURAL GASOLINE, BUTANE-PROPANE, MOTOR FUEL, FUEL OILS

No. 130



REFINER'S NOTEBOOK

Diffusion Equations in Design of Open Discharge Systems

by S. Chesler* and B. W. Jesser†

THE Von Hohenleiten and Wolff [1] included stack velocity as one of their variables in a model study of smoke plumes prior to building of the Riverside station of Baltimore Consolidated Gas & Electric Co. They found that stack velocity has a considerable effect on the elevation of the plume. Fig. 2 reproduces one of their plots and indicates the difference in smoke plumes produced by stack velocities of 15 ft. per second and 50 ft. per second with a 10 m.p.h. wind. With a lower wind velocity, the larger stack velocity should be even more effective in placing the plume at a higher elevation. Studies made after the completion of the plant at Baltimore showed that the correlation between model and actual plant was very good. Furthermore, the results with a 50-ft. per second velocity were so encouraging that, when subsequent units were added, they were designed for 40-ft. per second velocity and nozzles were incorporated in the stack outlets. Although the velocities involved are much lower than the 500-1,000 ft. per second that might be obtained in a relief valve discharge pipe, the experience at Baltimore does give a qualitive indication of what can be expected.

*Piping engineer, and †head of piping analytical section, M. W. Kellogg Co. From paper presented at A.S.M.E. Toronto meeting, 1951.

Taylor, Grimmett, and Comings [2] determined the velocity and momentum profiles of jets of air mixing with air through velocity ranges of 30 to 800 ft. per second. Their study was carried out to a distance 30 diameters from the nozzle, at which point the instantaneous velocity at the axis of the jet was still 22 per cent of the initial velocity. Albertson et al 3 in a similar study found that the center-line velocity at 100 diameters was still 6 per cent of the initial velocity.

Combining the above observations and applying them to the vertical discharge from a relief valve into an atmosphere moving horizontally at 1 m.p.h. it is reasonable to assume that the flow pattern would be as shown in Fig. 2. The gases would first rise in a vertical cone for some distance and then would roll over into the horizontal. It appears that this phenomenon can best be incorporated into the Bosanquet-Pearson equation by using an "effective stack height." This effective stack height would equal the height of the actual outlet plus an allowance for velocity for which 60 to 100 diameters of the outlet pipe size appears to be a reasonable figure.

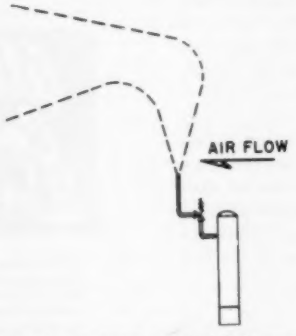


Fig. 2—Anticipated effect of high stack velocity on gas discharge from relief valves. (Low wind velocity.)

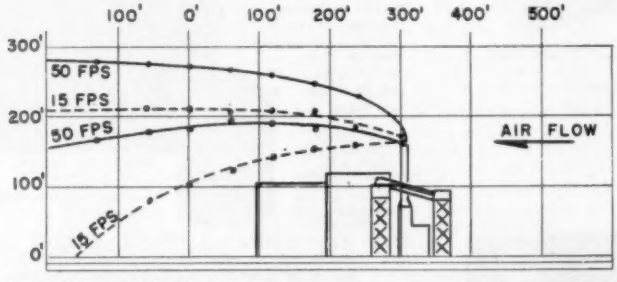


Fig. 1—Effect of moderate stack velocity on smoke pattern showing upper and lower limits of smoke path (10-m.p.h. wind and 167-ft. stack elevation). Courtesy, von Hohenleiten and Wolff.

Since the Bosanquet-Pearson and Sutton equations are based on eddy diffusion, density is not considered as a factor. However, density may enter the over-all phenomenon by exerting its effect before the diffusion process starts. This is forcibly brought out by Thomas, Hill, and Abersold [4] in their discussion of the effect of temperature. They point out that with low wind velocities, smoke at high temperatures will rise to high levels above the stack before coning out as per the diffusion equations. With high wind velocities the hot gases are blown nearly horizontally from the top of the stack and thus temperature and density effects are practically negligible. Therefore, with low wind velocity and density less than air, one would expect a gas to rise before "coning out" and with density greater than air to fall vertically before coning out. This latter effect has very definitely been observed in refineries on many occasions when hydrocarbon vapor has been seen to roll out of the top of a stack and drop toward the earth.

References

1. Von Hohenleiten, H. L. and E. F. Wolff, Trans. A.S.M.E. 64 (1942), p. 671.
2. Taylor, J. F., Grimmett, H. L. and E. W. Comings, Chem. Eng. Progress, (1951) p. 175.
3. Albertson, M. L., Dai, Y. B., Jensen, R. A. and H. Rouse, Trans. A.S.C.E. 115 (1950) p. 639.
4. Thomas, M. D., Hill G. R., and J.N. Abersold, Ind. & Eng. Chem. 41 (1949) p. 2409.

DON'T RISK PAINT FAILURE

New, free book brings industrial painting facts up to date. We don't make paint. But to help you get full value from the paint you buy, we'll send you this fact-packed book on aluminum paints. Read it before you plan another paint job. It can save you time and dollars.

You may know that aluminum paint is best for many places in your plant, but do you know what *kind* of aluminum paint is best for each job? Some are specially formulated for painting metal and masonry, others for wood, others for heated surfaces. Mail the coupon for the free book that answers these and hundreds of other paint questions.

SEND FOR FREE BOOK

ALUMINUM COMPANY OF AMERICA,
Paint Service Bureau, 1791-G Gulf Bldg., Pittsburgh 19, Pennsylvania.

Please rush me free copy of "Painting with Aluminum."

Name (please print)_____

Address_____

City_____ State_____

We plan to paint the following_____

Look for this shield on aluminum paints made by many paint manufacturers using ALCOA PIGMENTS.

ALCOA ALUMINUM

ALBRON

LIGHT!

for FAST, ACCURATE SOIL RESISTIVITY TESTING

New Model 243A Vibroground has all the features for "painless" field use, plus rugged construction and high accuracy. Check the data below . . . then write today for complete details and price.

- DIRECT READING . . . 0 to 30,000 ohms/cm.³
- FAST, TWO-STEP OPERATION
- WEIGHT only 8½ lbs. with cover removed!
- SMALL . . . 9" x 6" x 6½"
- ACCURATE to 2% of full scale
- TOUGH . . . steel case . . . shatterproof glass . . . baked enamel scale
- LOW UPKEEP . . . standard flashlight cells . . . spare vibrator built in . . . spare probe tip

ASK FOR BULLETIN 105A

ASSOCIATED RESEARCH, Incorporated
"Precision Instruments Since 1936"
3761 WEST BELMONT AVENUE • CHICAGO 18, ILLINOIS

Always Cold Water Gotkool WATER CANS AND COOLERS

GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug-fitting, large, removable top, handy, non-leaking, push-button faucet. GOTT Water Cans for handy field use. Your supply store has them, get one today!

GOTKOOL WATER CAN
Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. Push - Button Faucet at slight additional cost.

GOTKOOL WATER COOLER
Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.

KEEP PURE DRINKING WATER ALWAYS HANDY
INSIST ON THE GENUINE . . . Look for the Blue and Black Label With the Name GOTKOOL in Red.

H. P. GOTT MFG. CO.
WINFIELD, KANSAS

by W. L. Nelson
Technical Editor

PROGRESS IN METALS

Thermal Shock and Thermal Fatigue

BULLETIN No. 10 (April 1952) of the Welding Research Council (29 West Thirty-ninth Street, New York) by Helmut Thielsch is entitled "Thermal Fatigue and Thermal Shock." It is a complete review of published and unpublished information on the little-known characteristics of thermal fatigue and shock; effect of stresses, design, structure, carbon migration, intergranular oxidation, phase transformations, welding, etc.; occurrence of thermal fatigue and shock in various services; and the testing procedures used to evaluate fatigue and shock.

Definitions . . . When the service life of a high-temperature material is governed primarily by the number of thermal cycles (rather than the intensity or the rapidity of temperature change), failure is generally ascribed to thermal fatigue. However, when the severity of the temperature gradient or the rate of change of temperature is the main cause of failure, failure is ascribed to thermal shock.

Mechanism of failure . . . The mechanism of thermal fatigue and shock failures involves the development of stresses which result in (1) crack formation and (2) crack propagation. Since microcracks or notches are inherently present in many structures and weldments, thermal fatigue and shock failures may, in most instances, be the result of crack propagation alone. In the absence of inherent cracks and with the exception of extremely severe applications of thermal shock, considerable time is generally required to develop the stresses necessary to produce the initial crack, because creep will tend to reduce the magnitude of the stresses.

When it is important to minimize the effects of thermal fatigue and shock, care should be taken to produce structures essentially free from microcracks and notches. For example, welding electrodes, procedures, and techniques should be selected which prevent cracking in the weldment, particularly in the root deposit. In hardenable alloy steels, factors causing hydrogen embrittlement should be prevented by the use of suitable preheat treatments and/or the use of low-hydrogen electrodes.

Factors that promote failure . . . In pipe, tube, and other connections where one part is placed onto another and is joined as by riveting, mechanical clamping, or welding at the edge or side with a fillet weld, so-called fretting corrosion or friction oxidation may cause fatigue cracks in the surfaces which only are in "friction" contact with each other.

Carbon migration may occur across the bond whenever any two ferrous alloys of different chemical composition are intimately joined together and are exposed to temperatures at which the diffusion rates of carbon in steel are appreciable. In dissimilar-metal joints consisting of austenitic stainless-steel weld deposits on ferritic alloy steels or chromium stainless steels the minimum temperature at which noticeable carbon migration may occur is at about 1,050°F. (565°C.)—provided that the time of exposure is of sufficient duration. When considerable carbon migration has taken place from the ferritic-base steel into the stainless-steel weld metal, where it tends to precipitate in the form of carbides, the strength of the dissimilar-metal joint may be noticeably reduced in the decarburized zone of the ferritic material adjacent to the bond. This may result in an increased susceptibility to failure in this zone from thermal fatigue or shock. Heat treatments at temperatures which may cause excessive carbon migration should, preferably, be avoided.

Intergranular oxidation generally occurs in ferritic-to-austenitic joints which are operated at or near the oxidation limit when the stress concentration along the bond, resulting from thermal fatigue, may destroy or crack the protective scale on the ferritic steel. In an oxidizing atmosphere, this may result in oxide penetration into the ferritic steel at or near the bond. The stresses which cause stress oxidation of a dissimilar-metal joint, exposed at elevated temperatures, are usually inherent to the construction and cannot be readily reduced.

Oil process piping . . . Although in most transfer lines thermal fatigue or shock failures are associated with dissimilar-metal joints, in a number of cases thermal fatigue has been responsible for failure within the pipe and not in a joint.

In certain refinery processes, hot oil may be flowed at regular intervals through cold pipes. The sudden heating causes the inside of the pipe to expand. However, since expansion is resisted by the colder outside layers of the pipe the hot inner layers will be stressed in compression. Cracking may occur on cooling when the inside of the pipe is in tension.

Such failures are more common in transfer lines of austenitic stainless steels which show a much greater susceptibility to cracking than do ferritic steels. The differences may be explained by the fact that the common austenitic stainless steels show less ductility between 1,100° and 1,800° F. (595° and 980°C.) than many ferritic grades. Moreover, the lower heat conductivity and higher coefficient of expansion of the austenitic grades would make them more susceptible to fracture at these temperatures. Thus although in short-time elevated-temperature tests the fully austenitic grades generally will exhibit tensile elongations of over 20 per cent, they do, at times, tend to fail suddenly.

MAGCOBAR HIGH YIELD makes a balanced mud even with brackish water

- **spudding**
- **core holes**
- **workovers**

Carefully mined from selected deposits, Magcobar High Yield Drilling Mud is a stable clay well suited for use with brackish water. High Yield is a ready mixed mud in dry form. Only water need be added to provide a superior drilling mud for use in spudding, drilling core holes, and workovers where a low weight mud is desired with proper viscosity, gel strength and good wall building properties. Precisely processed and classified, Magcobar High Yield Drilling Mud is resistant to salt and other contaminants often present in make up water. It has proved to be a valuable additive to high pH-lime muds for control of viscosity and filtration properties. High Yield Drilling Mud makes approximately 50 bbls. of 15 centipoise mud per ton and is one of the most economical materials for building a balanced mud. Ask your Magcobar engineer or nearby Magcobar Dealer how you can save long water hauls and rig time with High Yield Drilling Mud.

MAGCOBAR • MAGCOGEL • HIGH YIELD • MAGCO-FIBER • KACT CLAY • FIBER SEAL • LEATHER-FLOC • FORM-A-PLUG • CELLO-SEAL SALT GEL • MAGCO-PHOS • RED OX • MAGCO-MICA • TANNATHIN JEL-OIL MUD • JEL-OIL "E" • "E" CONCENTRATE • NOHEEV MY-LO-JEL PRESERVATIVE • QUEBRACHO • CHEMICALS

MAGNET COVE BARIUM CORP.

One of the Dresser Industries

MALVERN, ARKANSAS HOUSTON, TEXAS

Magcobar

Complete

DRILLING MUD SERVICE

DEALER

One of the Best Things That Ever Happened to the Oil Industry

Critical Flow

by Ralph F. Nielsen*

IT has been pointed out in previous installments of this series that the various pipe-line and meter formulas derived break down for extremely high pressure drops over short distances, that is, for extremely high velocities. In the case of a nozzle, for instance, it is found that, with constant upstream pressure, the velocity increases with decreasing pressure at the throat up to a certain point, beyond which further decrease in pressure at the throat does not cause further increase in flow. Flow under these latter conditions is said to be "critical."

The mathematical relations governing the point at which critical flow occurs may be arrived at by considering the venturi-meter formula (Engineering Fundamentals No. 486):

$$Q = 0.97 \times 10^6 \, d_2^2 \, p_1 \, R^{1/k} \left[\frac{k}{(K-1) G T_1 Z_1} \, \frac{1 - R^{(k-1)/k}}{1 - R^2 r^4} \right]^{1/2} \quad (1)$$

where R is the ratio P_2/P_1, r the ratio d_2/d_1, and the other symbols have the usual significance. According to calculations based on this formula, as p_2 is decreased, p_1 remaining the same, Q will go through a maximum. Actually this does not occur. The equation breaks down due to the assumptions made in its derivation, including that of reversibility, which do not apply at extreme velocities. However, taking the point at which the calculated Q is a maximum as being significant, this point is found by setting the derivative with respect to R equal to zero (dropping the last denominator, which is nearly unity):

$$\frac{2}{k} R^{2/k - k} = \frac{k-1}{k} R^{1/k} \quad (2)$$

*Associate professor, petroleum and natural gas engineering, Pennsylvania State College.

$$R \text{ (max Q)} = [2/(k+1)]^{k/(k-1)} \quad (3)$$

In the case of a dry natural gas for which k = 1.27, R (max Q) = 0.56 by Equation 3. This value agrees quite well with experiments. Thus if the pressure drop across a nozzle or orifice delivering a dry natural gas is such that p_2/p_1 is less than 0.56, further reduction in the downstream pressure does not cause an increase in flow. In other words, the flow is critical. Fig. 1 shows a curve based on Equation 1 with $d_2 = 1$, $p_1 = 100$, k = 1.27, and R is varied.

If the value of R given by Equation 3 is substituted back in the expression for the flow rate it is found that u_2, the velocity at the point where the pressure is p_1 R (max Q), approximates the velocity of sound, relative to the upstream velocity. This is given by:

$$u \text{ (sound)} = (kgP/s)^{1/2} \quad (4)$$

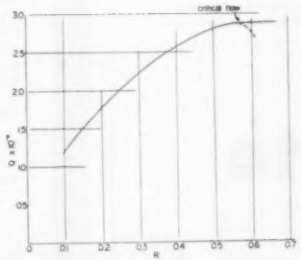


Fig. 1—Effect of ratio R of upstream pressure to pressure at the throat on flow through venturi meter.

Denoting the critical value of p_2/p_1 by R*, the orifice meter formula:

$$Q = c \, (p \Delta p / GTZ)^{1/2} \quad (5)$$

becomes, setting $p = p_1$, $\Delta p = p_1 - p_2$, $p_2 = R^* p_1$.

$$Q \text{ (crit)} = c p_1 \, [(1 - R^*)/GTZ]^{1/2} \quad (6)$$

This applies to all values of p_2 less than $R^* p_1$. For critical flow, then:

$$Q = \frac{Cp}{(GTZ)^{1/2}} \quad (7)$$

where C is a constant for critical flow, and p, T, and Z apply to the upstream conditions. Thus the flow of a gas may conveniently be determined under critical conditions by calibration of an orifice or nozzle. The "critical flow prover" and "choke nipple," for instance, are very convenient in determining flow from gas wells. The same precautions as for other metering devices, such as a certain run of straight pipe, or straightening vanes, must be observed with critical-flow provers. The design of the critical-flow orifice and choke nipple should also conform to certain specifications.

A pressure regulator may be operating under critical flow conditions at times. The capacity of a pressure regulator is usually given as:

$$Q = K \, [p_2 \, (p_1 - p_2)]^{1/2} \quad (8)$$

where K is a constant depending mostly on the size of opening, etc., and to some extent on the gas and temperature. If p_2 is equal to or less than that for critical flow, that is, less than $p_1 R^*$, the flow is given by:

$$Q = K \, p_1 \, [R^* \, (1 - R^*)]^{1/2} \quad (9)$$

obtained by substitution of $p_1 R^*$ for p_2 in Equation 8.

Reference

1. Diehl, Natural Gas Handbook, Metric Metal Works, Erie, Pa.

TWELVE different kinds of work gloves, formerly needed for various operations in one large plant, have been replaced by a single type of cotton work glove dip-coated with VINYLITE Brand Resins.

Men who handle rough steel, lumber or concrete blocks report how durable these gloves are. Welders like their protective qualities. They're strongly resistant to acid and alkali solutions. They're more comfortable—flexible enough for any ordinary glove operation. Their rough surface means a surer grip and longer wear.

Wherever the job calls for hard work involving contact with oils, greases, chemicals, heat or abrasive surfaces, gloves with coatings of VINYLITE Brand Resins have outlasted all others and given greater protection to the wearer, with resulting increases in efficiency and economy.

Glove-coating is one example of how VINYLITE Resin Coatings are being used to give increased protection and longer life to a wide variety of surfaces including metal, concrete, masonry. Formulated for application by dip, brush or spray, they may have a big place in your operations. Ask us about your specific needs and send for a list of suppliers of work gloves coated with VINYLITE Brand Resins. Write Dept. LQ-68.

Data courtesy Arcadia Mfg. Co.
1081 S. Eton Rd., Birmingham, Mich.

Vinylite
BRAND
RESINS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

---

this Catalog answers every Oxy-Acetylene Welding and Cutting Need for the Oil Industry

MECO Catalog No. 140 is an "encyclopedia" of the finest Oxy-Acetylene Equipment you can buy—the complete quality line for low-cost operation. Send for your FREE copy today, also name of your nearest distributor.

Meco
Modern Engineering CO., Inc.

3403 W. Pine Blvd. St. Louis 3, Mo., U.S.A.

HIGH COSTS For Pump Repairs and Well Pulling

Due to Pump Trouble

ARE OBSOLETE

Save UP TO 80%
UP TO $2500.00

per year on a SINGLE well

For Rod or Tubing Pumps

And it may not cost you a cent . . . for in many cases the MARTIN PLUNGER costs no more than the replacement of your present plunger. MARTIN CAGES, with their long life, synthetic rubber ball guides, protect balls and seats and increase savings. Ask almost anyone around Freer or Smackover, or Oklahoma City, or wherever hard pumping conditions are found.

Sold thru your supply company.

Field representatives:

E. W. Brockman, Tel. 7-7477, Tulsa
Don C. Davis, Tel. Wilson 8055, Ft. Worth
Tom Hulett, Tel. 3-4545, El Dorado, Ark.
L. K. Martin, Tel. 2-5317, Corpus Christi
J. L. Davis, Tel. MOhawk 4891, Houston

JOHN N. MARTIN
MANUFACTURER

9 W. Brady St., Tulsa, Okla. Tel. 4-9415

Use of Reinforced Concrete

REINFORCED - concrete bottoms are considered applicable in tanks for storage of crude oils and gas oils, or in any oil tank where the bottom is covered with water. On existing crude-oil tanks such bottoms are installed when steel is extensively deteriorated, and/or when external corrosion is of considerable magnitude. The concrete is actually more than a protective liner—it is an integral part of the vessel designed to prevent leakage.

From an economic standpoint, cost of a reinforced-concrete bottom runs to approximately 85 per cent of the cost of a new ¼-in. steel bottom; 65 per cent of the cost of a new coal-tar-coated ¼-in. steel bottom; and 50 per cent of the cost of a new gunite-protected ¼-in. steel bottom.

Because of excellent impermeability, an air-entrained concrete mix is employed. A liquid-type air-entraining agent is added at the batch plant to produce 3 to 5 per cent by volume on entrained air. Slump of the concrete varies from 4 to 6 in., and a minimum compressive strength of 3,000 psi. is developed.

Tank preparation and installation . . . After the tank has been cleaned and made gas free, one or two door sheets are removed. All buckles in the steel bottom are ripped across high points in order to allow plates to contact the soil. Door-sheet openings are modified by the installation of suitable steel plates so as to make the bottom of openings above the top of the finished concrete, which is 10 in. thick at the periphery.

On riveted tanks, water stops are welded on all vertical shell joints just above the finished concrete height so as to prevent leakage into the calking space. Rivet heads below water stops in vertical seams are removed, and rivets are seal-welded to the shell. Supporting columns (on fixed-roof tanks) are shortened 6 in., and 36 by 6-in. precast reinforced-concrete blocks are installed under the column bases.

The curb angle, and at least the lower 12 in. of the shell, are thoroughly cleaned by sandblasting. Immediately following, the cleaned portion above the curb angle is painted with a coal-tar-base primer. A sufficient portion of the second shell ring above a door-sheet opening is removed to permit entrance of front-end loading machines into the tank.

Reinforcing steel is installed, as shown in Fig. 1. Tie rods (¾ in. in diameter and 3 ft. 10 in. long, bent 90° at each end in planes at 90° to each other) are installed radially. These rods are set against the curb angle on 3-ft. centers, and are attached by welding. Floor steel, consisting of ⅜-in.-diameter bars laid both ways on 12-in. centers, is placed and tied at intersections.

Circular reinforcement at the periphery is provided by the installation of three rings of ⅝-in. diameter bars (as shown), with ⅜-in. diameter formed spacers installed on 9-ft. centers. Sheet-metal (14-gage) forms, 14 in. wide by 6 ft. long, with a ⅜-in. flange on the bottom, are provided to form the calking groove at the juncture of the bottom and the shell. These forms are set with the ⅜-in. flange resting on top of the curb angle, and are held in place against the shell by hand as concrete is placed against them.

As soon as sufficient concrete has been placed so that additional work in the area will not disturb it, wedges of proper taper are driven between the shell and the form so as to produce the groove. Ordinarily wedges on 3-ft. centers are adequate. After the concrete has taken a set (1½ to 2 hours), wedges and forms are removed and reused.

Placement of concrete is started at the location most distant from the delivery point, and the bottom is completed as a continuous monolithic pour. As illustrated in Fig. 1, the concrete bottom is poured 6 in. thick to within a radial distance of 3 ft. from the shell, at which point the thickness is gradually increased to where the outer 6 in. of the bottom is 10 in. in thickness. Reinforcing steel is raised to its proper height, with hooks, just ahead of the concrete stream. The concrete is given a wood-float finish, and is cured by flooding with water for 7 days.

After curing has been effected, the concrete surface of the calking groove is coated with a coal-tar-base primer. A ⅜-in. layer of high-heat (pour temperature, 250° to 300° F.) coal-tar-base mastic is placed in the groove. Twisted strands of oakum are then calked in layers as follows:

First layer: three ½-in. strands of oakum.

Second layer: five ½-in strands of oakum.

Third layer: five ½-in. strands of oakum.

The top of the groove is then filled (approximately 1½ in.) with high-heat coal-tar-base mastic so as to complete the sealing operation.

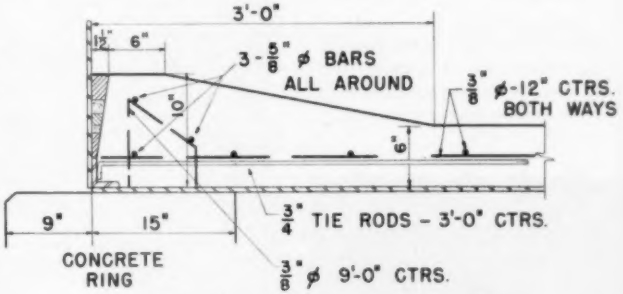


Fig. 1—Dimensions for concrete and reinforcing layout.

MARLOW self-priming centrifugal pumps make it easy to dependably feed oil to the main lines of gathering systems. For example: The Marlow shown below is one of those in use at Shawnee, Oklahoma, transferring oil from isolated tank batteries at the rate of 120 bbls. per hour at 43 lbs. pressure.

A Marlow is so simple, rugged and foolproof that it requires practically no attention and will last indefinitely. You can rely on Marlow pumping.

As manufacturer of the world's largest line of self-priming centrifugal pumps, Marlow can help you to have a better gathering system. Write us about your problem without obligation.

MARLOW PUMPS
544 Greenwood Ave.
Ridgewood, N. J.
Engineers and Representatives Everywhere

Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. This list is compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Cities Service Pipe Line Co.—64 miles, 18-in., planned, Sour Lake, Tex., to Lake Charles, La. Completion date 1-1-53.

Continental Pipe Line Co.—105 miles, 8-in., contracted, Rincon to northwest of Sullivan City on to Port Isabel, Tex. Western Const. Co. Completion date 9-30-52.

217 miles, 12-in., authorized, Wichita Falls, Tex., to Ponca City, Okla. Completion date 1952.

Cooperative Refinery Association.—48 miles, 6-in., authorized, Phillipsburg, Kans., to Holdredge, Neb.

Gulf Refining Co.—80 miles, 24-in., authorized, Midland to Colorado City, Tex.

22 miles, 10-in., authorized, Wortham to Corsicana, Tex.

Humble Pipe Line Co.—4, 6, 8, 12-in., proposed, Upton and Reagan counties, Texas.

201 miles, 12-18-in., planned, Hawkins to Baytown, Tex.

Interstate Oil Pipe Line Co.—30 miles 16-in., authorized, Moore to Flora, La. Completion date 1953.

68 miles, 16-in., authorized, Raceland to Anchorage, La. Completion date 11-52.

18 miles, 12-in., authorized, LaRose to Raceland, La. Completion date 10-52.

55 miles, 16-in., authorized, Sunset to Anchorage, La. Completion date 12-52.

21 miles, 12-in., planned, Duck Lake and Bayou Sale to New Iberia, La. 9-52.

63 miles, 12-16-in., planned, Flora to Bunkie, La. Completion date 12-31-52.

42 miles, 4-6-10-in., underway. Esperance Pt., Fairview and Lisemore Landing, La., to Cranfield, Miss., Latex of Georgia. Completion date 8-15-52.

Malco Refineries, Inc.—60 miles, 4-in., under way, Pettigrew, Tocito field to Hospah field (San Juan basin, New Mexico).

Pan American Pipe Line Co.—27 miles, 26-in., planned, Genoa to Texas City, Tex. Completion date 12-52.

40 miles, 14-in., planned, Arden Station in Irion County to Eldorado Station in Schleicher County, Texas. 6-52.

Pasotex Pipe Line Co.—195 miles, 8-in., under way, El Paso to Wink, Tex.

Platte Pipe Line Co.—1,075 miles, 16, 20-in., under way, Worland, Wyo., to Wood River, Ill. Completion date 1952.

573 miles, 16-20-in., under way, Worland, Wyo., to Holdredge, Neb. R. H. Fulton & Co., contractor. A. A. Carrigan, spreadman at Scotts Bluff, Neb.

142 miles, 20-in., under way, Holdredge, Neb., to Kansas State Line, Fulton & Brodie, contractor, J. T. Brodie, spreadman.

Section 7. 274 miles, 20-in., Missouri River to Salisbury, Mo., and Section 8, Salisbury to Mississippi River, under way. O. R. Burden Construction Co. Al Perry, spreadman at Carrolton, Mo.; river crossing field office, Hartford, Ill. Dick Jernigan, spreadman.

Progress Pacific Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas to California.

Rancho Pipe Line System.—455 miles, 24-in., authorized, McCamey to Houston, Tex. Completion date late 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., Phillips Pipe Line Co., and Ashland Pipe Line Co. with Shell Pipe Line Corp. handling construction and operation.)

267 miles, contracted, McCamey to Cedar Valley near Austin, Tex. Anderson Bros. Corp.

190 miles, 24-in., contracted, Austin to Shell's Deer Park Refinery (Houston area).

68 miles, 24-in., under way, Deer Park refinery west to Brazos River. Oklahoma Pipe Line Constructors, contractor. Spread 1—Louis Visentine, Pasadena, Tex.; Spread 2—Raymond Law, 1100 Old Spanish Trail, Houston.

126 miles, 24-in., under way, Brazos River west to Austin. Houston Contracting Co.

Roosevelt Oil & Refining Corp.—22 miles, 4 and 6-in., authorized, St. Helens to Norwich, Mich.

Service Pipe Line Co.—33 miles, 16-in., planned, Bowie, Tex., to Drumright, Okla.

30 miles, 6-in., Knox and Haskell counties, Texas.

29 miles, 4, 6, 8-in., proposed, Natrona County, Wyoming.

170 miles, 12-in., proposed, Tioga to Williston, N. D.

Shell Oil Co.—276 miles, 14-in., under way, Wood River, Ill., to Chicago. R. B. Potashnick, contractor. Chester Kinkead, spreadman at Peotone, Ill Completion date 10-52.

Shell Pipe Line Corp.—42 miles, 8-in., authorized, Halletsville to LaGrange, Tex. Completion date 7-1-52.

Sinclair Pipe Line Co.—674 miles, 22, 24-in., under way, Drumright, Okla., to East Chicago, Ind. Completion date 1952.

Section 1—150 miles, 24-in., under way, Drumright-Cushing, Okla., area, to Humboldt, Kans. O. R. Burden Construction Co.

(Spread) 1) 60 miles, 24-in., under way, Caney to Humbodlt, Kans. A. B. Haynes, superintendent, at Chanute, Kans.

(Spread 2) 90 miles, 24-in., under way, Cushing, Okla., to Caney, Kans. Floyd Lewis spreadman at Hominy, Okla.

184 miles, 24-in., under way, Humboldt, Kans., to Salisbury, Missouri. R. H. Fulton & Co., contractor, M. L. Boyd and Jerry Nash, spreadmen.

176 miles, 22-in., under way, Salisbury, Mo., to Forest City, Ill. O. R. Burden, contractor.

Southern California Edison Co.—41 miles, 8-in., under way, Etiwanda to Santa Fe Springs, Calif. J. E. Young Pipe Line Contractors, Inc. Jack Cook, spreadman. Completion date 10-15-52.

Sterling Pipe Line System.—53 miles, 12-in., authorized, Sterling, Colo., to connection with Platte Pipe Line at Gurley, Neb. (Includes 20 miles, 10-in., main line; 35 miles, 8-in., branch lines.) Joint venture comprising Toronto Pipe Line Co., Shell Pipe Line Corp., and Texas Pipe Line Co.

Sun Pipe Line Co.—99 miles, 4, 6, 8-in., proposed, Scurry County, Texas.

34 miles, 8-in., planned, Jameson to Colorado City, Tex.

20 miles, 8-in., authorized, Claytonville to Colorado City, Tex. Completion date 11-1-52.

Texas Pipe Line Co.—319 miles, 22, 12, 10-in., under way, Louisiana Gulf Coast to Port Arthur, Tex.

175 miles, 16-in., under way, Corsicana to East Houston, Smith Contracting Corp. Frank Craig, spreadman at Teague, Tex. Completion early summer.

86 miles, 22-in., under way, Gueydan east to Morgan City, La. Houston Contracting Co. F. A. Silar, superintendent at Abbeville, La.

65 miles, 6, 8, 10-in., under way, and 30 miles, 12-in., Houma, La., south through Terrebonne Bay vicinity. Houston Contracting Co. H. L. Leake, superintendent at Houma

Toronto Pipe Line Co.—100 miles, 6-10-12-in., authorized, Merino, Colo., to Gurley, Neb. Completion date 10-31-52.

West Coast Pipeline Co.—986 miles, 20-22-in., planned, Snyder, Tex., to Norwalk, Calif.

West Texas Gulf Pipe Line Co.—466 miles, 26-in. under way, Colorado City, Nederland, Tex., Anderson Bros.

112 miles, 20-in., planned, Wortham-Longview, Tex.

22 miles, 10-in., planned, Wortham-Corsicana, Tex.

79 miles, 24-in., planned, Midland-Colorado City, Tex.

Products Pipe Lines

Bell Oil & Gas Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla. (Includes 114 miles, 8-in., 32 miles, 6-in.) Completion date 6-1-53.

Buckeye Pipe Line Co.—370 miles, 8, 12, 16-in., authorized, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. (Sections divided as follows: 75 miles, 16-in., 218 miles, 12-in., 77 miles, 8-in.). Completion of 16-in., 1952, balance 1953.

77 miles, 16-in., under way, Macungie, Pa., to Linden, N. J. H. L. Gentry Const. Co. A. J. Brown, spreadman at Coopersburg, Pa. Completion date 10-15-52.

Coastal Products Pipe Line Co.—260 miles, 20-in., proposed, Houston to Baton Rouge.

Derby Oil Co.—30 miles, 4-in., under way, Wichita to Bell, Kans. Completion date 7-1-52.

Gulf Refining Co.—78 miles, 8-in., under way, Port Arthur to Deer Park, Tex., Glaser Const. Co., Barry Const. Co.

28 miles, 8-in., under way, El Vista to Orange, Vawter Const. Co., I. R. Stewart Const. Co.

Keystone Pipe Line Co.—60 miles, 12-in., proposed, Pt. Breeze, Pa., to Montello, Pa. Completion date 12-31-52.

Ohio Oil Co.—255 miles, 8, 10-in., proposed, East St. Louis, Ill., to Indianapolis. Conyes Const. Completion date 11-52.

Phillips Petroleum Co.—50 miles, 8-in., authorized, Goldsmith to Spraberry, Tex. Completion date 11-52.

Phillips Pipe Line Co.—35 miles, 6-in., authorized, Okmulgee, Okla., to Tulsa. Smith Contracting Co. Completion date 10-52.

68 miles, 12¾-in., under way. Osawatomie westward to Wichita, Kans. Brown Lite Co. R. E. Carriker, spreadman at Osawatomie, Kans.

40 miles, 10-in., through Monteau, Cole, Osage, and Gasconade counties, Missouri. Trojan Const. Co. E. L. Maggard, spreadman at Linn, Mo.

Under way, Paola, Kans.-Harrisonville, Mo. Smith Contracting Corp.

74 miles, 8-in., under way, looping from Decatur, Ill., to East Chicago, Ind. Somerville Const. Co., contractor.

137 miles, 10-in., authorized, looping from Paola, Kans., to East St. Louis, Ill.

Pioneer Pipe Line Co.—(Continental Pipe Line Co. and Sinclair Pipe Line Co.). 310 miles, 8-in., under way, Sinclair, Wyo., to Salt Lake City, Utah.

Progress Pacific Pipe Line Co.—900 miles, 10-in., proposed, California to West Texas.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

330 miles, 8-in., planned, Salt Lake City, Utah, to, Boise, Idaho. Completion date 12-1-52.

Shell Oil Co.—565 miles, 8-14-in., under

VETERAN PIPELINER calls Bantam® "Best"!

CULVER 2145 PIPE LAYING

WILLIAM A. CURTIS CORPORATION
CONTRACTORS
983 HUMBOLDT ST.
ROCHESTER 10, N. Y.

July 9, 1951

Schield Bantam Co.
Waverly, Iowa

Gentlemen:

We have been in the business of pipe laying for 27 years. Through these years, we have found the Bantam Hoe does the most dependable job. Of all makes, the Bantam is the most adaptable for mobility, excavation, trenching, crane work, and handling of pipe. In canvassing our operators, to determine which equipment to invest in, it was their opinion that -- "Bantam will do the job best."

Very truly yours,
William A. Curtis Corp.

Charles J. Curtis
Secretary

When experienced pipeline contractors like Wm. A. Curtis Corp., Rochester, N. Y. buy *4 new Bantam Back Hoes in 4 years*, it should pay you to investigate. Here's why. Truck-mounted Bantam Hoe costs only a fraction of the price of bigger machines . . . yet gives you big work capacity, plus high speed mobility for handling widely scattered trenching, hoisting and backfilling jobs on a production basis. Call or write us today for prices and free Bantam demonstration.

Look! less than **$6100.00**

F. O. B. Waverly, Iowa

(less truck and mounting charges)

Includes complete Buntam Back Hoe unit with boom, stick, and bucket. Price subject to change without notice.

MAIL COUPON FOR COMPLETE FACTS!

Schield Bantam Co.
243 Park St. Waverly, Iowa

☐ Send details on BANTAM Hoe, including crane adaptor and backfill blade.

Name _____
Position _____
Company _____
Address _____
City _____ State _____

SB-H-SD

SCHIELD BANTAM
Cranes • Excavators
Get more jobs done at less cost

for fast reliable "Pipealigning"

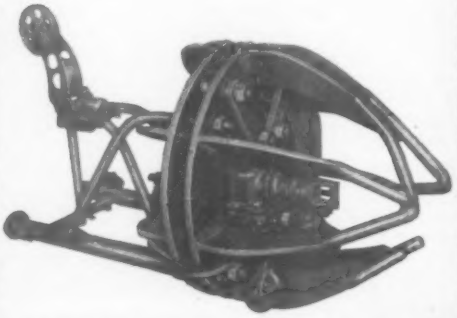
CROSE

INTERNAL LINEUP

CLAMPS

are "tops" in the field!

This popular hand-operated internal lineup clamp is designed to give trouble-free operation under all operating conditions. You get prefect alignment and continuous uninterrupted stringer bead that eliminates pinholes and weak welds due to tacking. Costly stringer bead cut-outs due to misalignment are eliminated. Made in 10 sizes for pipe from 12" to 36". The Crose "Electroaligner" electrically operated lineup clamp is also available for pipe sizes from 20" to 36". Send for illustrated folder showing other Crose pipeline supplies and equipment.



M. J.

CROSE

MANUFACTURING COMPANY, INC.

TULSA • HOUSTON • NEW YORK • SAN FRANCISCO

way, Wood River via East Chicago to Detroit; 35 miles, 14-in. R. B. Potashnick, contractor. Completion date summer of 1952.

Sinclair Pipe Line Co.—10-in., Houston to Baton Rouge; 16-in., Kalamazoo to Detroit; 20-in., Marcus Hook to Bayonne, N. J.; East Chicago to South Bend, Ind.

8-10-in., planned, Sinco to Port Arthur, Tex.

Standard Oil Co. (Ind.).—316 miles, 12-in., proposed, Sugar Creek refinery to Dubuque, Iowa. Completion date 1-1-53.

Standard Oil Co. (Ohio).—17 miles, 6-in., authorized, Toledo to West Toledo, Ohio.

Sun Pipe Line Co.—110 miles, 8-in., under way, Fostoria to Hudson, Ohio.

Susquehanna Pipe Line Co.—123 miles, 6, 8-in., proposed, Fostoria to Randolph, Ohio.

Tuscarora Oil Co.—74 miles, 6-10-12-in., under way, Allentown to Midland, Pa.

United States Pipe Line Co.—1,000 miles, proposed, Gulf Coast via Memphis, Nashville, Tenn., Lexington, and Paducah, Ky., to Cincinnati, Ohio.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—160 miles, 24-26-in., under way, New Jersey to Connecticut River near New Haven. Williams Brothers, contractor. Robert L. Buck, project manager, Danbury, Conn. Spreadmen: Thelmer Davis, Waterbury, Conn., O. L. Martin, Sloatsburg, N. Y., O. R. Mitchell, Danville, N. J. Completion date 8-1-52.

270 miles, under way, New Jersey, Connecticut, Rhode Island, and Massachusetts. Completion date 9-1-52.

Allied Gas Co.—24 miles, 6⅝-in., proposed, McLean to Champaign County, Illinois.

Arkansas-Missouri Power Co.—140 miles, 2-10-in., planned, Arkansas and Missouri.

Associated Natural Gas Co.—88 miles, authorized, Missouri.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Cities Service Gas Co.—179 miles, 4-30-in., gathering system in vicinity of Ulysses, Kans. Vaughn & Taylor Construct. Co., Inc. D. D. Vaughn, spreadman, Ulysses.

21 miles, 26-in., proposed, Franklin and Anderson counties, Kans.

15 miles, 20-in., Craig County, Oklahoma, to Lawrence County, Missouri.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R. H. Fulton & Co., contractor. Jerry Nash spreadman at Lamar, Colo.

16 miles, 4-in., Pueblo County to Fowler, Colo.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Dow Chemical Co.—70 miles, various sizes, Midland, Saginaw, and Bay City, Mich. Mahoney Contracting Co., contractor. Ralph Bucher, spreadman at Midland.

East Tennessee Natural Gas Co.—172 miles, 22-in., authorized, Greenbrier to Oak Ridge, Tenn.

100 miles, 16-in., proposed, Knoxville to Kingsport, Tenn.

El Paso Natural Gas Co.—133 miles, 30-in., proposed, looping along main line in Texas, New Mexico, Arizona.

36 miles, 24-in., proposed, looping from Kingman to Franconia, Ariz.

Frederick Gas Co.—26 miles, 4-in., planned, Redlands to Frederick, Md.

Georgia Gas Co.—32 miles, 4½-in., proposed, Bogart to Gainesville, Ga.

Glacier Gas Co.—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Grand Valley Pipe Line Co.—105 miles, 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Interstate Gas Co.—1,000 miles, 30-in., planned, Gulf Coast to North Kentucky.

Home Gas Co.—32 miles, 12-in., authorized, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hancock to Sanford, N. Y.

Hope Natural Gas Co.—33 miles, 8-10-12-in., planned, Wyoming County, West Virginia, south to Buchanan County, Virginia.

Houston Pipe Line Co.—50 miles, 16-in., authorized, Edna to Tom O'Connor. Completion date 9-1-52.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., authorized, Washington County to Cedar Rapids, Iowa.

¾ to 6-in., under way, Davenport, Iowa, and Moline, Ill. C. E. Wilson Const. Co.

Kansas-Nebraska Natural Gas Co., Inc.—179 miles, proposed, Kansas and Nebraska.

20 miles, 16-12-in., planned, Hastings to Grand Island, Neb. Completion date 1952.

18 miles, 6-8-in., planned, McCook, Neb., south. Completion date 1952.

54 miles, 4-6-in., planned, Neligh to Hartington, Neb. Completion date 1953.

49 miles, 10-in., planned, Ogallala to North Platte, Neb. Completion date 1952.

20 miles, 12-in., planned, Atwood to near Oakley, Kans. Completion date 1952.

Kansas Power & Light Co.—27 miles, 20-in., authorized. Pratt, Kans., to Calista compressor station.

28 miles, 12-16-in., planned, north of Kansas to Meade County gas field.

Lake Shore Pipe Line Co.—45 miles, 10¾-in., authorized, northwesterly from T.G.T. system near Meadville, Pa., to Ashtabula, Ohio. Harford Bros., contractor.

Lone Star Gas Co.—100 miles, proposed, storage fields to the Dallas-Fort Worth area. 35 miles, 12-in., proposed, southeastern Schleicher County.

Manufacturers Gas Light & Heat Co.—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

Michigan Gas Storage Co.—93 miles, 16, 22, 24-in., under way, Laingsburg to near Pontiac and Mount Clemens, Mich. (Includes 17 miles of lateral lines.) Mahoney Contractor. Completion date 6-52.

30 miles, 26-in., authorized, looping between Laingsburg and Mount Pleasant Junction, Mich.

Michigan Gas Utilities Co.—77 miles, under way, Sturgis, Hillsdale, and Coldwater, Mich. (22.7 miles, Marshall south to Coldwater; 20 miles, Coldwater easterly to Hillsdale; 22.5 miles, Hillsdale to Sturgis, 11 miles, Hillsdale to Jonesville.) Somerville Const., contractor, Jim Godwin at Coldwater.

MidSouth Gas Co.—240 miles, proposed, Greene, Poinsett, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, and Cross counties, Arkansas.

Minneapolis Light & Power Co.—20 miles, 30-in., under way, Minneapolis, Williams Brothers, contractor. F. W. Caldwell, spreadman.

Mississippi River Fuel Corp.—98 miles, 16- and 18-in., authorized, feeder line from Lincoln Parish, Louisiana, to Waskom field, Harrison County, Texas.

40 miles, 18-in., authorized, Dubach to Perryville, La.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

Montana Power Co.—52 miles, 16-in., authorized, Canada-Montana border to Cut Bank, Mont.

BANKS . are people. Probably more than in any other American enterprise, the person you deal with, is as important as any other factor. This series of ads is designed to help you know more about your "FIRST" friends in Tulsa.

Paging Dick Wagner

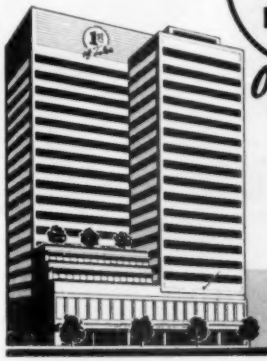
. . Who Knows How

Yes, Dick knows "paging" for he started his banking career as a page boy back in 1935. His latest Horatio Alger step was his promotion to Assistant VP last year, and he has been urging bankers all over the Middle West—especially the Rocky Mountain and Northern portions—to "Think—FIRST" since 1945.

Dick was with Uncle Sam for 3½ years in the Pacific, but after leaving Tulsa University, his "one and only" has been this institution.

He has more than a hobby in tennis, having been Tulsa, Oklahoma State and Missouri Valley Singles Champion. We could say, then, that he has two rackets —tennis *and* banking—and he's very good at both.

Think **1st** *of Tulsa*



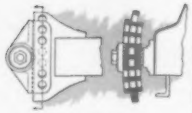
THE FIRST

NATIONAL BANK AND TRUST COMPANY OF TULSA

Member Federal Deposit Insurance Corporation

When in Tulsa, you are cordially invited to visit our new building. See the FIRST Mural interpretation of the famous Oklahoma "runs."

Another reason why BAKER is the BETTER blade



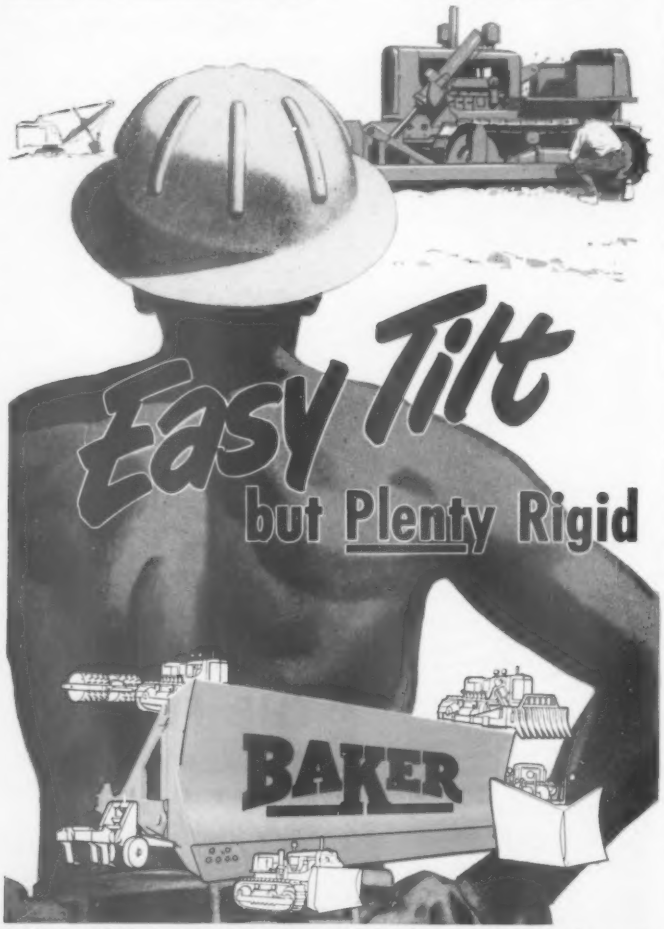
Baker Blades are designed not only for peak flexibility, but for *rigidity.* With up to 12 inches of tilt available in five positions, the operator simply adjusts the frame at the trunnion brackets by shifting two pins. Also, adjustments are made on an *arc* movement which provide *full bearing contact* in all positions.

That's why owners and operators say Baker Blades will take a beating and *stay solid*—without developing "play" or shimmy.

The complete line of Baker Bulldozers, Gradebuilders and Root Rippers—all easily *interchangeable,* too—is manufactured exclusively for Allis-Chalmers Crawler Tractors. Three mountings are available: engine-mounted hydraulic, frame-mounted hydraulic (the revolutionary 9-X "No Push Beam" 'Dozer) and cable-controlled types.

Call or write your Baker, A-C Dealer today—ask for *proof* why Baker is the better blade—dollar-wise—for *you.*

THE BAKER MANUFACTURING CO.
Springfield, Illinois



Baker—The most versatile line of tractor attachments

Morganfield Natural Gas Co.—31 miles, 4-6-in., authorized, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east of Hillsdale; 22 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 8 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, 10-in., proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—104 miles, 14, 16, 20-in., authorized, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in., in Potter County, Pennsylvania, and 21 miles 14-in., replacement in Line No. 507, New York.)

52 miles, 16-in., contracted, Utica to Amsterdam, N. Y. (to begin at completion of Zelienople). Williams-Austin. Howard Bauer, superintendent. Completion in 90 days.

30 miles, 20-in., contracted, Angelica to Rossburg, N. Y. (begin at completion of Cayuta - Ithaca). Williams - Austin. Howard Bauer, superintendent. Completion in 45 days.

17 miles, 16-in., contracted, Colesburg Junction to Sabinsville, Pa. (begin at completion of Angelica job). Williams-Austin. Howard Bauer, superintendent.

21 miles, Columbiana and Stark counties, Ohio.

48 miles, 10-in., proposed, Oneonta and Norwich to DeRuyter, N. Y.

Niagara Mohawk Power Corp.—55 miles, 0-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor. Howard Bauer, superintendent. Completion date 9-52.

20 miles, 10-24-in., under way, Syracuse, N. Y. H. L. Gentry Const. Co., contractor. Bob Cantrell spreadman at Syracuse. Completion date 10-1-52.

Northeastern Gas Transmission Co.—221 miles, 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

400 miles, 24-in., proposed, Emerson, Manitoba south to Red River Valley through Fergus Falls on to St. Paul, Minn.

140 miles, 4-6-8-in., under way, south of Colla, Kans., to Guymon, Okla. Reese Bros. Const. Co. E. H. Reese, spreadman at Hugoton, Kans.

750 miles, planned, Washington, Oregon, and Idaho.

373 miles, 24-in., proposed, Eastport, Idaho, to Monroe, Wash.

79 miles, 18-in., proposed, Monroe to international boundary near Lynden, Wash.

29 miles, 22-in., proposed, Monroe to near Seattle, Wash.

164 miles, 20-in., proposed, Seattle to Portland, Oregon.

Northern Indiana Fuel & Light Co.—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

373 miles, 24-in., proposed, Eastport, Idaho, to Monroe, Wash.

79 miles, 18-in., proposed, Monroe to International boundary near Lynden, Wash.

29 miles, 22-in., proposed, Monroe to near Seattle, Wash.

164 miles, 20-in., proposed, Seattle to Portland, Ore.

Ohio Fuel Gas Co.—31 miles, 20-in., authorized, Licking County to Richland County, Ohio.

22 miles, 16-in., authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., authorized, Wellington to Elyria, Ohio; 16 miles, 20-in., authorized, Benton Station to Crawford Station. 18 miles, 20-in., Crawford Station to near Columbus. 16 miles, 16-in., authorized, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., authorized, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, authorized, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

Oklahoma Natural Gas Co.—41 miles, 12-in., authorized, 21 miles Bethany to El Reno, Okla.; 16 miles, Haskell; 14 miles, Henryetta. Completion date 8-30-52.

Pacific Gas & Electric Co.—44 miles, 8-in., under way, Salinas to King City, Calif. W. M. Lyles and company crews. Completion date 6-10-52.

141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

10 miles, 10-12-in., authorized, Monterey to Fort Ord to Castroville; 12 miles, 16-in., Napa Wye to Shellville, 6 miles, 12-in., Cotati to Santa Rosa, Calif.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

174 miles, 30 and 26-in., contracted. Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor.

44 miles, 26-in., Edgerton, Mich., Anderson Brothers.

22 miles, 30-in., looping in Tuscola, Ill.

45 miles, 30-in., looping in Montezuma, Ind.

63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvanian Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. Section 1—27 miles, under way and contracted by Harford Brothers. Section 2—25 miles.

Peoples Natural Gas Co.—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

Permian Basin Pipeline Co.—384 miles, 20-30-in., proposed, Permian basin area to eastern New Mexico.

139 miles, planned, Upton County, Texas, to Lea County, New Mexico.

76 miles, planned, Lea County to Roosevelt County, New Mexico.

169 miles, planned, Roosevelt County, New Mexico, to Carson County, Texas.

Phillips Petroleum Co.—250 miles, 30-in., underway, gas gathering system, Midland and Glasscock counties, Texas, Vaughan & Taylor Const. Co. Completion date 10-52.

200 miles, 2 to 30-in., authorized, Midland, Upton, Glasscock, and Regan counties, Texas. Completion date 5-53.

65 miles, 4 to 30-in., authorized, Goldsmith field system, Texas. Completion date 1-53.

28 miles, 10-in., authorized, Bayou Plant to Adams Terminal. Completion date 7-53.

Piedmont Natural Gas Co.—36 miles, 8-10-12-in., under way, west of Greensboro to Burlington, N. C. Gragg Construction Co. Hubert Gragg, supt., at Greensboro.

Public Service Co. of Colorado.—95 miles, proposed, Douglas Creek and other gas fields to Grand Junction, Colo., area.

Public Service Co. of North Carolina.—83 miles, 8-in., authorized, Kings Mountain to Asheville, N. C. Completion date 3-1-53.

Rockland Light & Power Co.—22 miles, 8-in., proposed, Orangetown to Tompkins, Cove, N. Y.

South Carolina Natural Gas Co.—160 miles, 16-12-10-in., proposed, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C.

South Georgia Natural Gas Co.—339 miles, 2-12-in., proposed, Florida and Georgia.

Southern California Gas Co.—35 miles, planned, Antelope Valley, California.

Southern California Gas Co. and Southern Counties Gas Co. of California.—45 miles, 30-in., proposed, looping on line from Arizona border to Los Angeles.

81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Southern Natural Gas Co.—1,255 miles, 24 to 4½-in., proposed, Louisiana, Mississippi, Alabama, and Georgia.

21 miles, 24-in., authorized, Perryville Station, La., to Boeuf River.

14 miles, 24-in., authorized, Onward Station, Miss., to Big Sunflower River.

14 miles, 14-in., authorized, Perryville Station, La., to Wilhite Gate.

375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 20 miles in Ouachita Parish, 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.

Southern Union Gas Co.—21 miles, 20-in., authorized, Albuquerque, N. M.

27 miles, 10-in., authorized, Lea and Eddy counties, New Mexico.

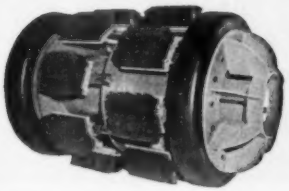
30 miles, 12-20-in., contracted, San Juan County, New Mexico. R. H. Fulton & Co.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

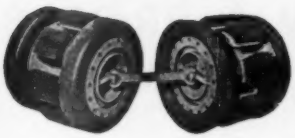
Tennessee Gas Transmission Co.—591 miles, 24-30-in., proposed, looping along present sys-

THE PIG WITH THE POKE CLEANS PIPE LINES

MORE CUBIC FEET PER DAY...
THROUGH NATURAL GAS LINES
CLEANED by WILLIAMSON PIGS

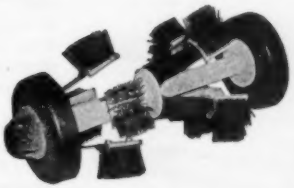


GP-2 16"-30"
Similar design 10" to 14" sizes. Will traverse all standard pipe-line gate valves and field bends of approx. 12 ft. radius.



GP-3 18"-30"
Similar design 10" to 16" sizes. Will traverse long-radius welding ells up to 90° lengths. Also through port and many conventional gate valves.

WC-12 6"-14"
Will traverse all standard pipe-line gate valves and field bends.



Other designs for sizes smaller than 6"

REPRESENTATIVES

H. E. Davis, Los Angeles 15, Calif. — James S. Kone Co., Amarillo, Texas — Keyes Tank Co., Provo, Utah — Keyes Tank & Supply Co., Casper, Wyoming

Canadian Equipment Sales & Service Co., Ltd.
Edmonton, Calgary, Toronto, Canada

WRITE FOR COMPLETE INFORMATION

T. D. Williamson, Inc.
TULSA 9, OKLAHOMA

tem (consisting of 323 miles of 30-in.; 167 miles of 26-in.; 101 miles of 24-in.)

420 miles, 30-in., Texas, Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky.

101 miles, 26-in., Kentucky and Ohio.

304 miles, 24-in., proposed, Mercer, Pa., to Utica, N. Y.

116 miles, 30-in., underway, three loops, from Refugio to Cleveland, Tex.; Oklahoma Pipe Line Constructors. Ed Flanagan, Victoria, Tex.

80 miles, 26-in., contracted, Harrison County to Jackson County, Ohio. H. C. Price Co., contractor.

(Spread 1)—24 miles, 26-in., contracted. Carrollton, Ohio, southwestward to Harrison County, Ohio. H. C. Price Co., contractor.

(Spread 2)—56 miles, 26-in., contracted, Athens, Ohio, to Jackson County, Ohio. H. C. Price Co., contractor.

126 miles, 30-in., under way, Arkansas, Louisiana, and East Texas. Houston Contracting Co.

(Spread 1) 43 miles, 30-in., under way, Gallion, La. Houston Contracting. W. H. Hayes, superintendent, M. L. Thompson, assistant superintendent.

(Spread 2) 45 miles, 30-in., under way, Eros, La., to Coldwater, La. Houston Contracting. F. A. Silar, superintendent.

(Spread 3) 39 miles, 30-in., Sabine River south to Jasper Compressor Station. Houston Contracting. E. C. Norris, superintendent, R. E. Thornton, assistant superintendent.

202 miles, 20-26-30-in., proposed, Buffalo to Canada.

(Spread 1)—44 miles, 30-in., loops.

(Spread 2)—63 miles, 26-in., loops.

(Spread 3)—45 miles, 20-in., loops.

(Spread 4)—50 miles, loops.

Texas Eastern Transmission Corp. — 791 miles, 30-in., under way, Kosciusko, Miss., to Connellsville, Pa.

Section 8, 77 miles, 30-in., under way, Portsmouth to Amesville, Ohio. Anderson Brothers Corp.

Section 9, 74 miles, 30-in., under way, Amesville to Ohio-West Virginia river crossing. Anderson Brothers Corp.

Section 10, 66 miles, 30-in., under way, Ohio River to Connellsville, Pa. Anderson Brothers Corp.

Undetermined mileage, 30-in., Moundsville, W. Va. H. C. Price, contractor.

Undetermined mileage, 30-in., Woodsfield, Ohio. H. C. Price, contractor.

30-in., Wheeling, W. Va. Brown & Root.

315 miles, 24-in., proposed, Provident City, Tex., to Castor, La.

Texas Gas Transmission Corp.—408 miles, 26-in., proposed, looping from Bastrop to Hardinsburg, Ky.

223 miles, 26-in., proposed, Bastrop, La., to Covington, Tenn.

47 miles, 26-in., proposed, northeastward from Covington.

49 miles, 26-in., proposed, northeastward from Kenton, Tenn.

45 miles, 26-in., proposed, northeastward from Calvert City, Ky.

25 miles, 26-in., proposed, northeastward from Slaughters, Ky.

19 miles, 26-in., proposed, southwestward from Jeffersontown, Ky.

180 miles, 26-in., authorized, Acadia Parish to connection with existing facilities in Morehouse Parish.

35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

560 miles, 26-in., proposed, Louisiana and Kentucky.

361 miles, 26-in., under way, Mississippi River near Greenville, Mississippi to Jeffersontown Station, Ky. H. C. Price Co. Completion date 11-15-52.

46 miles, 26-in., under way, Bastrop, La., to north of Mississippi River. W. H. Hayes, superintendent. Houston Contracting.

Texas-Ohio Gas Co.—1,350 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va. Completion date 6-30-53.

Union Oil Co. of California.—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles basin.

United Fuel Gas Co.—32 miles, 20-in., under way, Lanham to Broad Run, W. Va. H. L. Gentry Construction Co., contractor. Frank Morris, spreadman at Charleston, W. Va.

United Gas Pipe Line Corp.—70 miles, 30-in., underway, Houston to So. Bank of Trinity River, Tex., Louis Visentine, Conroe, Tex.

510 miles, 20 to 30-in., under way, Agua Dulce, Tex., to Monroe, La. River Const. Corp., contractor.

Spread 1, 51 miles, 30-in., from Pearl River north and south of Jackson, Miss. Red Tatom, superintendent at Jackson.

Spread 2, 45 miles, 30-in., McComb to Pearl River south of Jackson. Merle Tatom, superintendent at Hazelhurst.

Spread 3, 30 miles, 30-in., Kosciusko south toward Jackson. Jimmy Reed, superintendent at Kosciusko.

Spread 4, 29 miles, 12-in., Lafayette to Jeanerette, La. Roy Earnhart, spreadman at Jeanerette.

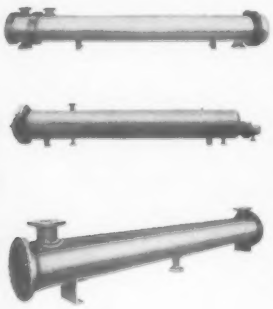
124 miles, Sterlington compressor station, near Monroe to Jackson, Miss.

23 miles, 8-12-16-in., South Louisiana facilities.

53 miles, 24-in., authorized, Texas.

36 miles, proposed, offshore from Ingleside to near Refugio, Tex.

AND SAW A PROBLEM



A TOUGH problem . . . one of those you really like to get your teeth into! We saw a vast portion of the Petroleum Industry CONCENTRATED in the Southwest . . . yet many heat transfer sources of supply were located far from these areas of activity. At Western we set about to offer this badly needed Heat Transfer Engineering Service "close-to-home". Rating . . . designing . . . engineering . . . fabricating of Shell-and-Tube Exchangers . . . Atmospheric Sections . . . Floating Head Exchangers . . . Reboilers . . . and Telescopic Exchangers. We saw a problem . . . and licked it for YOU.

All Western Heat Exchange Equipment is fabricated to TEMA Standards.

WESTERN
HEAT EXCHANGERS
Manufactured by
WESTERN SUPPLY COMPANY
P.O. BOX 1588 TULSA, OKLAHOMA
SALES OFFICES — DALLAS — HOUSTON

All contracted by **River Const. Corp.**, a joint venture including **Oklahoma Contracting Co.**; **J. Ray McDermott & Co., Inc.**, and **Morrison-Knudson.** Inspection by **Brown & Root, Inc.**

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in. planned, southern Alberta to Duluth, Minn.

Wilcox Trend Pipe Line Co. (Harry Bass Drlg. Co.)—150 miles, various up to 20-in., planned, gathering system for delivery to proposed Texas Eastern terminal at Provident City, Tex.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta-Vancouver Oil Pipe Line Co.—(Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek Alta., Idaho and Washington states to Vancouver, B. C.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganzo Azul field to Pucalpa on upper Ucayali River, Peru.

Condor.—90 miles, 12-in., under way, Genoa to Rho, near Milan, Italy. Soc. Ital. Condotte Acqua Montubi, contractor. Completion date 9-52.

Creole Petroleum Corp.—143 miles, 26-in., under way, Ule (State of Zulia) to Amuay (State of Falcon). Williams Bros. de Venezuela, S.A., contractor of overland sections. Charles Williams, manager; Marvin Jones, general superintendent, Maracaibo. McWilliams, Gahagan, and Anderson Brothers, contractors of water crossings. Completion date March 1953.

25 miles, 34-in., authorized, Lagunillas to La Salina (State of Zulia). Completion date April 1953.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Interprovincial Pipe Line Co.—100 miles, 16-in., contracted, Regina, Sask., to Gretna, Man., Canada. Anderson International Contractors, Ltd.

32 miles, 16-in., Kendal to Peebles, Sask., Canada.

67 miles, 16-in., Carroll to Somerset, Man., Canada.

Iraq Government.—135 miles, 12-in., proposed, from Iraq Petroleum Co. at Baija to Baghdad, Iraq. Construction 1952. M. W. Kellogg, contractor.

72 miles, 12-in., Zubair to Fao, Iraq. Arabian Bechtel Co., contractor.

Mene Grande Oil Co.—32 miles, 26-in., authorized, Anaco to Puerto La Cruz.

Middle East Pipelines, Ltd.—800 miles, 34-35-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Socony-Vacuum Oil Co., Inc.—20 miles, 8-10-in., under way, Hutchinson, Kans. Brown-Lite Contractor.

Spitz & O'Berine.—264 miles, 24-in., under way, Capetown to Tarrytown, South Africa. J. C. Spitzexplari, spreadman at Capetown.

Texas Petroleum Co.—60 miles, 4-6-in., under way, Pto, Nino to La Dorada.

Trans-Mountain Oil Pipe Line Co.—639 miles, 24-in., under way, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers.

472 miles, 24-in., under way, western section of line to Comstock Midwestern, Ltd. 221 miles, 24-in., under way, center section to Mannix, Ltd.

(Spread 1) 238 miles, Acheson to Lake Yellowhead.

(Spread 2) 109 miles, Lake Yellowhead to Blue River.

(Spread 3) 120 miles, Coquihalla Canyon to Burnaby.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles, 6-in., planned, Puerto Berrio to La Dorada, Colombia.

113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia, Carolina Construction Co.

75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor. Completion date 7-52.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—170 miles, 10-12-in., under way, Hamilton to Toronto, Ont., Canada, Comstock-Midwestern, Ltd., contractor. Completion date July 1952.

Petrocongo (Sub. Cie. Financiere Beige des Petroles, S.A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Societe des Transports Petroliers par Pipe Line.—160 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor. Completion date 1953.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar to Bogota, Colombia; Williams Brothers Co.; David Louthen, manager, Bogota.

CAN PREVENT ENGINE BREAKDOWN

IF . . . at the first hint of engine overheating or oil failure . . . you are *warned* or the engine operation is *stopped* immediately, then you can investigate and correct the fault before major *damage occurs.*

And that's exactly what the PENN Safety Control does . . . *automatically.* Every second, day and night, the PENN control "watches" so that overheated cooling water or oil pressure failure can't result in damage to your engines!

Learn more about this low-cost protection for *new and old engines.* Write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 East 40th Street, New York 16, N. Y., U. S. A. In Canada: Penn Controls Limited, Toronto, Ontario.

Typical Functions of PENN Safety Controls

Diesel Applications. Sounds an alarm . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

Battery Ignition Applications. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

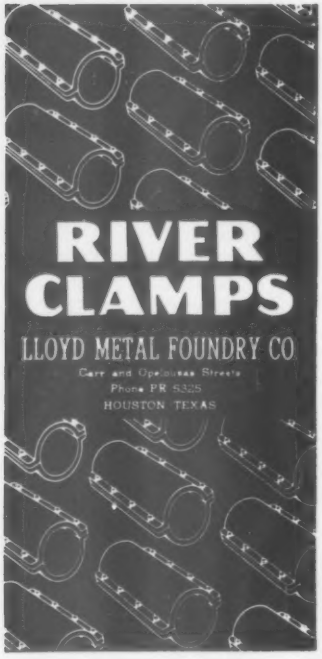
Magneto Ignition Applications. Sounds an alarm only . . . grounds dual magneto . . . grounds magneto only . . . grounds magneto and sounds alarm or lights signal light.

Duel Ignition Applications. Opens battery circuit and grounds magneto.

PENN

AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES



Proved Performance

Pipe Line River Crossings

- River Construction
- Hydraulic Dredging

Complete River Equipment

18 in. Hydraulic Dredges

Call GArfield 3656

MISSOURI DREDGING CO.
2100 North Wharf St.
St. Louis 6, Missouri

PIPE LINES

Big Program O.K.'d

Northern's $38,690,000 project approved by FPC

WASHINGTON.—Northern Natural Gas Co.'s big $38,690,000 expansion of its natural-gas-transmission system has been approved by the Federal Power Commission.

The program will expand the company's capacity north of Kansas from the current 600,000,000 cu. ft. per day to a new total of 825,000,000 cu. ft. The new capacity will be used by Northern to supply its existing utility customers in Oklahoma, Kansas, Nebraska, Iowa, Minnesota, and South Dakota.

New facilities in Texas, Oklahoma, Iowa, Kansas, Nebraska, and Minnesota include a total of 213 miles of 26-in. loops and an additional 100,160 hp. in compressor capacity.

Question on some . . . Approval of the FPC on other facilities estimated to cost an additional $29,360,200 was withheld until certain misunderstandings could be cleared up.

Northern proposed to build additional gathering systems, production plants, pipe lines, compressor stations, and gasoline plants, which it contends do not require commission authorization.

Some of thes facilities, the company holds, do not require this authorization because they do not affect system capacity. These amount to $3,750,000. FPC disagreed and required that the company file within 30 days for authorization or to establish that a certificate is not required.

Another $7,250,000 of the additional facilities, the commission found, had been erroneously classified by Northern. The company here too must file an application for constuction and operation within 30 days.

Order conditioned . . . The commission hedged the authorization of the first-mentioned facilities with the requirement that Northern must commit all of the natural-gas reserves which it controls to the performance of the approved 825,000,000-cu.-ft. service, as long as the gas may be economically produced from these properties.

This, however, would not prevent the normal trading of individual leases or wells solely for obtaining more-economic production units. The commission pointed out that this rule had been tacked on due to a previous indication that the company might sell or otherwise alineate a large part of these reserves if dissatisfied with the rate-making policies of the commission in regard to gas produced from its own acreage. FPC apparently foresaw the possibility of Northern's taking such action as a result of the commission's recent ruling *(The Oil and Gas Journal, June 23, page 43)* that gas produced from the company's own leases be figured at actual cost (2.5 cents per M.c.f.) in fixing its rates instead of at the 8-cent minimum fixed by the Kansas Corporation Commission in its conservation law.

Texas Eastern's Compressor Changes Approved by FPC

WASHINGTON. — Texas Eastern Transmission Corp., Shreveport, has been authorized by the Federal Power Commission to make compressor changes on a project the commission approved in February 1951.

Texas Eastern now has permission to build 12 compressor stations with a total of 102,540 installed horsepower instead of the 13 stations with 96,400 hp. previously authorized. The 12 station sites are in Mississippi, Alabama, Tennessee, Kentucky, Ohio, Pennsylvania, and New Jersey.

Total cost of the revised program is $20,062,500.

Tuscarora Adds New Section To Rebuilt Products System

HARRISBURG. — Tuscarora Oil Company, Ltd., last week added one more new section to its reconstructed 350-mile products system across Pennsylvania.

Initial operation is under way on a 50-mile, 10-in. line which links Freeport with Midland, the system's western terminus on the Ohio River.

By August, the new 6-in. spur connecting Pittsburgh to the main line will be opened, thereby expanding all-weather products movement into that city to 300,000 gal. per day. Replacing barge shipments from Midland, the expanded western system is designed for a 100 per cent future capacity expansion as products demands rise in the Pittsburgh area.

The reconstruction program is now completed from Midland eastward to

for long wear and efficient service
ASK FOR
B.F. Goodrich

Available at your nearest United Supply Store

HIGHFLEX ROTARY HOSE

For heaviest duty, deep drilling. Takes extreme bottom hole pressures. Qualifies for Grade C (5000 lb. test pressure). Most flexible hose for deep drilling. Crush-resistant. Recovers from sudden shock or impact.

GROMMET V-BELTS

Made of heat-resistant rubber. Twin grommets float in a bed of solid rubber. There are no plies of fabric to stiffen belt or decrease resiliency and ability to absorb shock. There is no splice, no stiff section where cords overlap.

UNCLE SANDY SAYS:
You can depend on your United Supply man for complete stocks of these B. F. Goodrich products . . . and he'll give you fast efficient delivery.

YOU CAN DEPEND ON UNITED SUPPLY!
UNITED SUPPLY
COURTESY • SERVICE • DEPENDABILITY

UNITED SUPPLY

AND *Manufacturing* COMPANY
TULSA, OKLAHOMA
Stores in: KANSAS, OKLAHOMA, TEXAS, LOUISIANA, AND NEW MEXICO

COURTESY • SERVICE • DEPENDABILITY

PERRAULT
PIPE CRADLES
for lowering in coated pipe

Perrault Brothers pneumatic lowering-in cradles reduce the cost of lowering in pipe and patching. These cradles save tractors and belts. Investigate this equipment. Try before you buy. Write or phone.

PERRAULT
Brothers Inc.
1130 NORTH BOSTON • TULSA 6, OKLAHOMA
TELEPHONE 5-1103 • EXPORT OFFICE, 30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y. PHONE CIRCLE 6-6260
Everything for the Pipeliner

Need Plain or Jacketed
CORRUGATED METAL
GASKETS?

Call CHICAGO-WILCOX
for PROMPT ATTENTION

Chicago-Wilcox understands the gasket requirements of refineries and is equipped to supply all types of gaskets, including plain or jacketed corrugated metal gaskets like these. Made of ingot iron, aluminum, stainless steel, copper, brass, nickel, and monel in all sizes and shapes.

Send specifications for quotations and prompt-delivery schedule.

CHICAGO-WILCOX MFG. CO.
7703 Avalon Avenue, Chicago 19, Ill.
Phone: SAginaw 1-1900

Tuckerton, near Reading. By November the $10,000,000 program will be completed with new lines laid into the Allentown area. There the common-carrier system will receive shipments from Buckeye Pipe Line Co.'s 16-in. line linking Allentown and Linden, N. J. When the Buckeye project is completed late this year, Tuscarora will abandon its old Linden to Reading line.

Initial capacity of the new Tuscarora system will be 43,000 bbl. per day. Provisions have been made for expanding this to 85,000 bbl. per day.

Shenandoah Gas Revamps Plans For Eastern Gas Line

WASHINGTON.—Shenandoah Gas Co., Lynchburg, Va., has filed an amended application with the Federal Power Commission to built a 39-mile gas line in northern Virginia and northeastern West Virginia at an estimated cost of $1,570,000.

Under the revised plan, the line would extend from a point near Middletown, Va., to points near Winchester, Va., and Martinsburg, W. Va. The company also wants to construct distribution systems in Winchester and in small communities along the route.

Service Pipe Line Opens Lovington, N. M., Office

LOVINGTON, N. M.—A new district headquarters has been opened here by Service Pipe Line Co. to supervise the company's expanded operations in Lea County.

James C. Dotson, former division gager at Denver City, Tex., has been placed in charge of the office as district superintendent, according to C. E. Wilson, West Texas division manager.

The new office building and warehouse is being staffed with 16 additional Service employes, transferring from other points.

Service Pipe Line Co.'s system in the area is already connected to 285 wells on 166 leases in Lea County, and the firm now is building a 26-mile, 10-in. line from Saunders pool to Denton pool to tie into its West Texas system.

The Saunders-Denton line, which will move oil east to the Wasson pump station, will be completed early this month. Its construction will give Service Pipe Line an extensive gathering and transportation system in northern Lea County.

Lines now run from Caprock to the firm's West Texas system at Slaughter station, with laterals serving Bagtower, Saunders, and Gladiola pools.

5-MICRON
FINISHED
PETROLEUM PRODUCTS
FILTERS

Fabricated in conformance with all JAN or MIL specifications for the removal of water and dirt down to 5 microns and smaller. Removal of this microscopic rouge lengthens the life of jet and gasoline aircraft engines, pumps, meters, valves, and fittings. Available in capacities from 10 to 2000 G. P. M. — for all finished petroleum products.

WARNER LEWIS
COMPANY
P. O. BOX 3096 • TULSA, OKLA.

S. E. HUEY & CO.
ENGINEERS & SURVEYORS
HENINGER BLDG.
MONROE, LA.

SURVEYING & MAPPING

PIPE LINE SURVEYS

See Composite and Refinery Catalogs, or Write for Folder on
FLEET-LINE
PIPE SADDLES

Nozzle sizes from 1/4" to 24"
ASTM A234

STEEL FORGINGS, Inc.
P. O. BOX 276-B SHREVEPORT, LA

HENRY H. PARIS DISTRIBUTOR Inc.

Manufacturer's Agent - Oil Well and Refinery Supplies

P. O. BOX 932 — 1125 ROTHWELL ST.

HOUSTON, TEXAS

Agent and Distributor for the following Nationally Known Manufacturers:

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC VALVES Bronze, Iron, Cast and Forged Steel for all purposes.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

GLOBE MACHINE & NIPPLE CO.
Houston, Texas
Arrow Brand Pipe Nipples—All Kinds.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

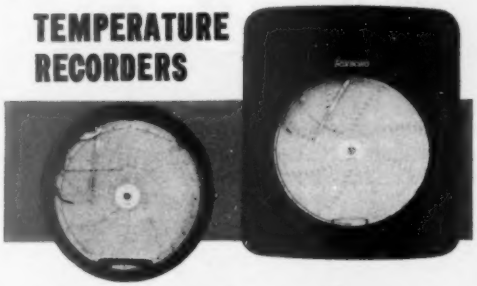
OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types Oil COUNTRY BOILERS.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels. Prevents spillage—easily loaded.

STEEL FORGING, Inc.
Shreveport, La.
Weld Saddles and Weld Sleeves.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps

TEMPERATURE RECORDERS



to avoid lost profits

Accurate Foxboro Temperature Recorders give you a minute-by-minute report of process conditions — an invaluable aid in determining future operation. Moreover, the records forecast impending difficulties — permitting corrections to be made before costly trouble starts.

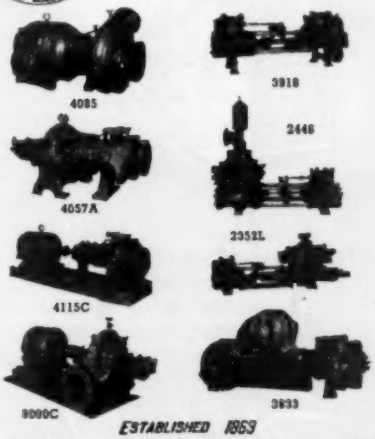
Available with vapor pressure, gas pressure, or liquid expansion type systems. Choice of 50 standard bulbs; 700 chart ranges and scales from −450° to +1000°F. Round or rectangular cases for all operating conditions. Exclusive Foxboro design and construction advantages detailed in Bulletin 447. (Temperature indicators and controllers also available.) Write **The Foxboro Company, 607 Norfolk St., Foxboro, Mass.**

FOXBORO TEMPERATURE RECORDERS

PUMPS

CENTRIFUGAL RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

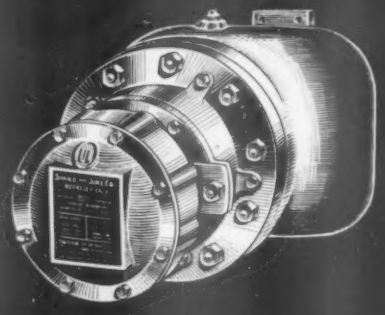
323 W. TENTH ST.

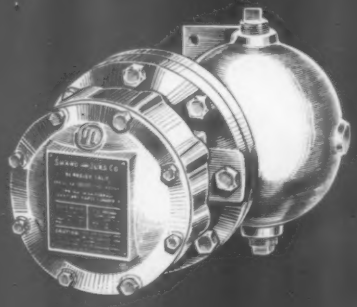
S&J LEVEL ALARMS

GUARDSMEN ALWAYS ON DUTY

One of these Shand & Jurs Liquid Level Alarms is sure to solve any installation problem arising from location or operating conditions and stand watch over valuable petroleum products. Their use to actuate electrical or air operated devices with respect to predetermined liquid levels is almost unlimited. They will dependably signal or indicate the rise or fall of liquid past a predetermined point in any type of vessel. They are vigilant in warning operating personnel of unsafe conditions BEFORE a danger point is reached. Each alarm is actuated by a stainless steel, counterweighted float in a cast steel body.

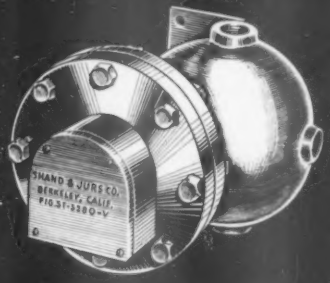
S&J Magnetic-Electric Level Alarm. Designated Fig. ST-4440-UL, it employs no stuffing box, but uses permanent 6 pole magnets to actuate a mercury switch located in an S&J Explosion Proof Switch Box listed by Underwriters Laboratories. The alarm is fully automatic in operation, and the body is designed for working pressures up to 500 pounds.





S&J Electric Level Alarm. Fig. ST-5230A, this alarm is fully automatic in operation. It utilizes the S&J Explosion Proof Switch Box listed by Underwriters Laboratories in which the mercury switch is connected directly to the float shaft. The body is designed for 300 pound service.

S&J Air Valve Level Alarm, Fig. ST-5280V, this alarm operates on from 15 to 20 pounds air line pressure, and is reversible in operation by a simple change of the link connection to the float shaft. Body is designed for 300 pound service.



Shand and Jurs Co. 8TH AND CARLTON STREETS : BERKELEY : CALIFORNIA

NEW YORK 295 Madison Ave · CHICAGO 1040V S. Western Ave · HOUSTON 027 M. & M. Bldg. · TULSA 310 Thompson Bldg · LOS ANGELES 714 W. Olympic Blvd. · SEATTLE 3000 Western Ave

MONTREAL, QUE., 360 Notre Dame St. West · VANCOUVER, B. C., 550 Beatty St · FORT ERIE, ONT. · DARLINGTON, ENG. · CARACAS, VEN

NATURAL GAS

Sales Continue Up

FPC reports gas companies' April sales up 10 per cent

WASHINGTON. — Sales of natural gas companies to consumers during April totaled 223,947,000,000 cu. ft., an increase of 9.8 per cent over that of April 1951, the Federal Power Commission reports.

Revenues from sales to ultimate consumers rose to $80,248,017, a 10.4 per cent boost over April of last year. Respective increases in revenue in the three classes of service—residential, commercial, and industrial—amounted to 9.1, 10.4, and 11.9 per cent.

The net income of the 87 gas companies reporting was $22,271,957, a 3.7 per cent increase over that of April 1951. Net income of $202,356,803 for the 12 months ending in April showed a 6 per cent increase over that during the same period last year.

Operating revenues of the companies were $161,796,865, a 13.2 per cent increase over the April 1951 receipts of $142,948,768. For the 12-month period ending April 30 revenue reached $1,710,078,997 to register a 19 per cent increase over that during the corresponding period in 1951.

The month's gas-utility operating income of $28,200,086 showed a 6.4 per cent boost over last year. Gas-utility operating income for the 12-months ended in April was $261,606,694, a 11.3 per cent increase over the comparable 1951 period.

A 14.8 per cent increase was chalked up in gas-operating revenue deductions during April, which amounted to $133,755,075. Of this total, operating expenses accounted for $97,472,654; depreciation for $12,514,097; taxes for $23,768,324.

FPC Manhandling Proposals For Wholesale Rate Hikes

WASHINGTON.—The Federal Power Commission appears to be taking a dim view of the flood of big rate-increase applications it has been receiving in recent months.

Since the end of June FPC has rejected proposed rate increases by Texas Gas Transmission Corp., Owensboro, Ky., ($12,480,000) and United Gas Pipe Line Co., Shreveport, ($8,400,000). These are only the largest. Hope Natural Gas Co., however, did some better. This firm's proposed $5,236,000 increase was pared to $2,905,000.

Earlier in June the commission dismissed an application for a $13,600,000 increase in rates of Transcontinental Gas Pipe Line Corp., Houston. This application was suspended last November.

In one action late in May, FPC rejected one and suspended four proposed rate schedules which totaled more than $50,000,000 a year and were scheduled to go into effect June 1. The rejection was on Mississippi River Fuel Corp.'s application for a $3,300,000 rate hike. Largest of the suspended schedules was Texas Eastern Transmission Corp.'s for $41,800,000.

Newest of the applications for big rate hikes was filed by El Paso Natural Gas Co. early this month. This increase would amount to $15,286,767.

Signal to Supply Long Beach With Huntington Field Gas

LONG BEACH, Calif.—Before January 1 gas from Huntington Beach oil field will be finding its way through Long Beach's municipal gas system and into the city's harbor oil properties in Wilmington field.

Signal Oil & Gas Co. is to supply the city with 20,000 M.c.f. of residue gas daily from its large Huntington Beach natural-gasoline plant. The gas will be used to meet domestic and industrial demands with the excess compressed and stored in certain reservoirs in Wilmington field. That not required for either use will be sold to Southern California Edison Co.

To transport the gas to Long Beach a 14-mile, 20-in. line will be laid at a cost of about $750,000. Bids for construction now are being examined. When the line is placed in operation late this year, Signal is to receive 18 cents per M.c.f. for the gas plus a 2-cent compression charge.

Long Beach's impending gas shortage is caused primarily by natural decline of upland wells.

Texas Production in March Drops 39 Billion Cubic Feet

AUSTIN. — Natural-gas production in Texas during April dropped off seasonally as expected to 405 billion cubic feet daily from the all-time record output of 444 billion cubic feet in March.

The state, however, did top all previous records for total output in March with an increase of 7.16 per cent over that produced in March 1951, the former high total for that month.

The monthly Texas Railroad Commission report showed net total for market increased even further to 337 billion cubic feet, a gain of 9.7 per cent.

Transmission lines continued to take the lion's share of the total, 248 billion cubic feet. Of this, about 160 billion cubic feet was exported from the state.

Other categories of ultimate disposition of gas produced in the state in April follow, with the corresponding increase or decrease over the same month last year in parentheses:

Extraction loss—plants, 16.6 billion cubic feet (up 20 per cent); plant fuel and lease use, 31 billion cubic feet (up 3 per cent); gas lift, 15.5 billion cubic feet (up 13 per cent); pressure maintenance and repressuring, 24.6 billion cubic feet (down 1 per cent); cycling, 43 billion cubic feet (down 12 per cent); carbon-black manufacture, 25 billion cubic feet (down 23 per cent); vented, 4.6 billion cubic feet (up 54 per cent).

Ohio Fuel Seeks 31 Billion Cubic Foot Storage Addition

WASHINGTON. — Ohio Fuel Gas Co., Columbus, Ohio, has revealed plans to expand its underground natural-gas-storage facilities by converting six producing pools in north central Ohio to storage service.

In its newly filed application to the Federal Power Commission to carry out the program, Ohio Fuel estimated capital cost of the proposed construction at $4,880,000.

This construction includes a 6,000-hp. compressor station, 78 miles of gathering lines, 14 miles of pipe line to connect the storage areas with existing transmission facilties, and auxiliary facilities.

The company would develop a new storage area in Holems, Wayne, and Ashland counties by converting four producing pools. Its Weaver storage area would be enlarged by converting one pool in Ashland and Richland counties. Conversion of another pool in Guernsey and Coshocton counties would provide still another new storage area.

Potential storage capacity of the six pools, Ohio Fuel says, is estimated at 31,100,000,000 cu. ft. of natural gas. This would bring total capacity of the company's storage projects to almost 143½ billion cubic feet.

LUBRICATE PLUG VALVES

10 to 15 times FASTER

One Company saved over $10,000.00 in one year!

Reduces plug valve maintenance costs ⅓.

Using the low-cost DELTA-DESCO SYSTEM one operator can lubricate 10 to 15 valves in the time usually required to lubricate one with the conventional jack screw. Think of the man-hours saved.

DELTA-DESCO

Plug Valve Lubrication

SYSTEM Includes DELTA Adapter Fittings, High Pressure Gun, DESCO Specialized Lubricants, and Engineering Service. Write for facts and figures.

ANOTHER VALVE SAVER —

DELTA AUTOMATIC Plug Valve LUBRICATOR

A simple device, lubricates valve each time it is opened and closed. Ideal for loading platform, manifold, LPG and other frequently used valves. Ask for catalog.

The Only Complete Plug Valve Lubrication Company

DELTA

DELTA-DESCO SYSTEM

ENGINEERING SALES CO.

806 Louisiana Ave. • Phone 5-2416

SHREVEPORT, LOUISIANA, U.S.A.

Sales Offices In All Principal Cities

REFINING

Tax Aid Climbs

Assistance granted by DPA passes $20,000,000,000

WASHINGTON. — The accelerated-amortization program passed the $20,000,000,000 mark last month, with more than 11,500 new or expanded facilities covered by certificates issued by the Defense Production Administration.

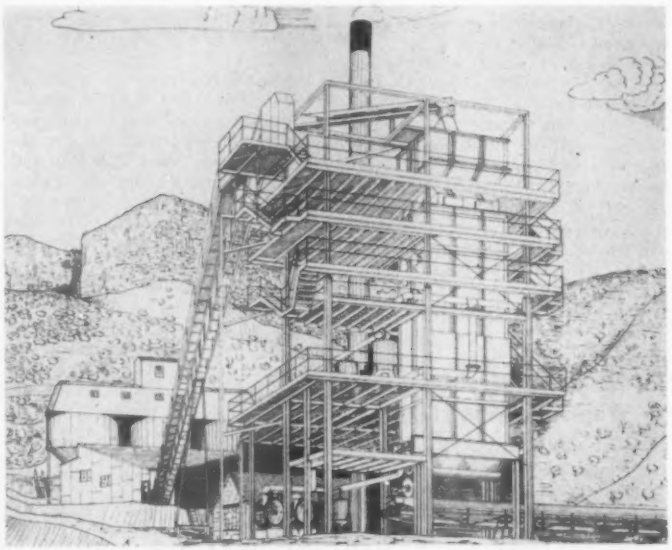
Since the beginning of the program in October 1950, certificates have been issued at a rate of roughly $1,000,000,000 a month. They now are beginning to taper off as the individual expansion goals set by DPA are reached.

So far as the oil industry's programs are concerned, however, there is still room for additional projects, a number of which are now being processed by the Petroleum Administration for Defense.

New projects . . . New projects approved by DPA during the week ended June 19 include a $5,000,000 gasoline facility to be built at Baytown, Tex., by Humble Oil & Refining Co., for which certificates were issued for accelerated amortization of 65 per cent of $4,100,000 of the investment and 50 per cent of $900,000.

Three butadiene projects were approved under which quick write-off of 60 per cent of the investment was granted for Dow Chemical Co. on a $3,480,000 plant at Freeport, Tex.; Firestone Tire & Rubber Co., for a $961,500 facility at Pottstown, Pa., and Union Carbide & Carbon Corp., for a $893,300 plant at Texas City, Tex. A certificate for fast amortization of 60 per cent of a $4,284,450 investment for styrene monomer at Port Arthur, Tex., was granted Foster Grant Co.

Transportation projects approved included a pipe line to be built in Los Angeles County, California by Southern California Edison Co. at a cost of $2,525,000, on which quick write-off of 40 per cent was approved; water transportation facilities to be built by B & M Towing Co., Houston, at a cost of $320,000; and unspecified facilities planned by Ada Oil Co., Sweeny, Tex., at a cost of $161,400. Both of the latter were granted write-offs of



New Shale-Squeezer at Rifle

This is an artist's conception of how the Bureau of Mines' new shale-oil extraction unit at Rifle, Colo., will look when construction, now making rapid progress, is completed. The new pilot plant will use an improved version of the continuous gas-combustion process now employed by the larger plant already in operation. It will test variables and solve problems arising during operation of the larger plant.

70 per cent. A certificate for 25 per cent of a $2,000,000 investment was granted Cal-Ore Pipeline Co., San Francisco, for an oil line.

Accelerated amortization on 40 per cent of $97,125 in storage facilities was granted Esso Standard Oil Co. at Utica, N. Y., and $81,050 at Peekskill, N. Y.; Ohio Oil Co. on $136,000 at Speedway City, Ind., and Oil Terminals Co. on $331,980 at Medford, Ore.

Tide Water Markets New Oil

NEW YORK. — A new product branded "Veedol High-Detergency Motor Oil" is now being marketed by Tide Water Associated Oil Co.

Refined from 100 per cent Pennsylvania crude, the new oil employs new types of additives which give it properties especially adapted for lubricating newer-model high-compression engines —particularly those with hydraulically operated valve mechanisms, Tide Water says.

Tests are still under way to determine what service designation the new oil will have for spark ignition and diesel-engine use. For the present they state that the oil is designed for use under the most severe driving conditions.

Lio.1 Awards Contracts For New Petrochemicals Plant

LULING, La.—Lion Oil Co. has let contracts for design and construction of its new Barton chemical plant near here.

Contract for design has been let to Chemical Construction Co., while Lummus Co. will be the primary construction contractor, according to T. M. Martin, company president.

The new petrochem installation will produce anhydrous ammonia and prilled ammonium nitrate from natural gas supplied by The Texas Co. from nearby fields in Louisiana.

The plant will be located on a 1,400-acre site on the west bank of the Mississippi in St. Charles Parish about 14 miles north of New Orleans. It will consist mainly of process units, with modern one and two-story buildings for administration, maintenance, warehousing, and employe servicing. It is expected to be in operation early in 1954, unless unforeseen shortages of material and equipment delay construction.

Richfield Reported Ready to Reveal Details of Expansion

LOS ANGELES. — Information on facilities to be added at Richfield Oil Corp.'s refinery here in the $43,000,000 expansion program approved by Defense Production Administration last fall probably will be released this week.

Types of large units involved in the project were withheld for "security reasons" when DPA issued certificates of necessity. The program, however, reportedly will be devoted to expansion of aviation-gasoline facilities and will result in a 20,000-bbl. increase in the plant's crude-charging capacity.

OIL and GAS BURNING EQUIPMENT for PETROLEUM REFINERIES

Detailed Information Gladly Sent Upon Request

CHEMICAL-PETROLEUM DIV.

NATIONAL AIROIL BURNER COMPANY, INC.

5236 E. WEDGLEY AVE. PHILADELPHIA 44, PA.

Southwestern Division: 2512 So. Blvd., Houston 6, Tex.

STEEL TURNBUCKLES

¾", ⅞", 1", 1¼" and 2" diameter carried in stock, in 6", 12", 18" and 24" length.

Black or Galvanized

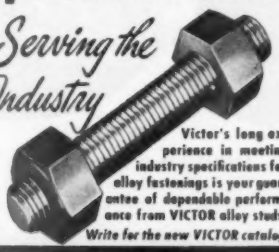
Write or wire for prices and delivery.

NORRIS BROTHERS, INC.

Robinson, Illinois

VICTOR ALLOY STUDS

Serving the Industry



Victor's long experience in meeting industry specifications for alloy fastenings is your guarantee of dependable performance from VICTOR alloy studs. Write for the new VICTOR catalog.

VICTOR PRODUCTS CORP.

2039 W. BELMONT AVE. • CHICAGO 18, ILL.

Slim was Skeptical

"DON'T TELL ME," HE SEZ. "I'VE HAD PLENTY EXPERIENCE. CRATE MY STUFF SO IT WON'T BUST? YAK! YAK! YAK!"

How wrong can a fella be?

PROCESSING AND PACKAGING: Scientific processing against corrosion, moisture, air, dust, all climatic conditions. Packaging for export or domestic shipment.

DOCUMENTATION: Preparation and forwarding the special documents in export shipping.

AIR SHIPPING: As agent for International Air Transport we arrange all details of shipment by air.

COUNSELING: At no obligation we will advise you on many of the complicated details of export shipping.

TULSA CRATING CO.

519 SO. ROCKFORD • TULSA 10, U.S.A.

PHONES 3-6482, 3-3492

memo to STORE MANAGERS

WHY YOU SHOULD SELL STITT SPARK PLUGS

1 Not available at corner filling stations nor automotive jobbers.

2 Sold as an Oil Field specialty. No direct sales to your customers.

3 Specially designed for Oil Field use.

4 Since 1918—at every major oil field discovery.

5 Steady, repeat business year after year.

6 New line with aluminum oxide insulator—receiving excellent acceptance—used by most major oil companies.

STOCK AND SELL STITT SPARK PLUGS

COLUMBUS 1, OHIO

this isn't a new story to Us!

for 14 years operators have been using H. C. SMITH JET-ACTION BITS with great success

power jet drilling

STRAIGHT-DOWN JET ACTION is the big reason. The jet nozzles on H. C. Smith Rock Bits are so placed that the fluid jet hits the bottom of the hole, instead of washing the side. Result—faster footage, true-gauge hole, longer life for cutter teeth.

These jet-action bits have been used with outstanding results from the Gulf of Mexico to Canada—from giant offshore rigs to mast jobs in the Canadian bush.

Note: It has been found by experience that pump pressures in the range of 1300-1500 pounds produce the most satisfactory results, although pressures as low as 950 pounds are successful on small holes.

AVAILABLE IN SIZES 8⅜"-9" on 4½" A.P.I. Pin. 9⅞"-15" on 6⅝" A.P.I. Pin. With various combinations of nozzle sizes and number of nozzles.

H C Smith OIL TOOL CO.

GENERAL OFFICES, EXPORT OFFICE AND PLANT: COMPTON, CALIF.

BRANCH OFFICES IN ALL PRINCIPAL OIL CENTERS IN THE UNITED STATES AND CANADA

Among the

Drilling Contractors

Brown Tackles Contract For Australia Deep Test

Brown Drilling Co., Long Beach, Calif., is engaged in assembling and moving equipment, materials and personnel to Australia where it has contracted to drill a deep exploratory test in a development program being undertaken by California Texas Co., Ltd.

The initial test, located in the western part of that continent, is scheduled to be drilled to at least 15,000 ft. The contractor's operations will be supervised directly by Allen Dysart, veteran drilling superintendent for the company. Personnel has been recruited from the company's California organization.

Already on the way to the "down under" continent in addition to Dysart are: David Smith, clerk; Albert Sturman, mechanic; Virgil Abbey, Charles Kemp, and Lee White, drillers. The remainder of the picked drilling crews will follow in the near future.

Location of the test is more than 800 miles inland across rough terrain from the nearest seaport at Freemantle and involves a major problem in transportation of heavy equipment.

Kemp Drilling Co., Shreveport, has two new contract operations under way in Mississippi. One, being drilled for R. C. Hynson, is an 8,400-ft. wildcat job, 1 Smith County Oil Co., located in the C SW NW 25-2n-6e, 2 miles south of Traxler, in Smith County. The other is a 6,800-ft. Wilcox test for Magnolia Petroleum Co. at 1 Benoist-Kingston, in 15-5n-2w, in the Kingston field, Adams County.

Gardner Brothers Drilling Co., Dallas, has moved an extra-large rotary rig into the Loco Hills pool of Eddy County, southeastern New Mexico, for a projected 13,500-ft. exploratory test contracted for Gulf Oil Corp. The test, 1 Federal-American, is in an area producing from the Grayburg formation around 4,500 ft.

Markhan Drilling Co., Oil City, La., has a light rig set up on a wildcat location a mile north of the North Vivian field, Caddo Parish, northwestern Louisiana, where it has a contract with J. K. Wadley of Texarkana for a 2,800-ft. Paluxy sand test, 1 Dominick. Location is in 11-22n-16w.

Delta Drilling Co., Tyler, Tex., has taken on a contract for deepening a formerly abandoned test in the Millhaven area, Ouachita Parish, northeastern Louisiana. The test, Peterson Drilling Co. 4-C Breece, was abandoned last August as dry in the Travis Peak at 6,506 ft. Hole will be deepened to the Cotton Valley formation.

Crow Drilling Co., Shreveport, is moving a heavy-duty rotary rig from eastern Texas for a deep wildcat test it will drill for A. R. Temple in Greene County, southeastern Mississippi. The projected wildcat, scheduled to go to 8,750 ft., is 1 Courtney. Location, in the C NE NE 2-2n-7w, is 6 miles west of Leakesville.

New California Company

Gould Fitch, formerly superintendent for Tracy Harkness Drilling Co., Bakersfield, Calif., and Joe Lewis, previously active in California refining circles, have teamed up in the organization of a new drilling contracting company to be known as the L. & F. Drilling Co. Main offices of the new company are at Bakersfield.

Viersen & Cochran, Inc., Okmulgee, Okla., will drill for Deep Rock Oil Corp. at a wildcat location, 1-C Griffin, in the C NE SW 31-12n-13w, Caddo County, Oklahoma.

Flourney & Haston, Hoisington, Kans., are drilling for Anschultz Drilling Co. 1 Younger, a semiwildcat located in the NE NE NE 7-14-17, ¾ mile southwest of the Toulon field, Ellis County, Kansas.

Southern Producing Co., Shreveport, has taken contract for a projected 10,500-ft. wildcat test which William G. Helis estate is starting in Plaquemines Parish, Louisiana, at 1 School Board. Location is 7 miles northeast of Houma, Terrebonne Parish.

Deep Fork Drilling Co., Bristow, has taken on a well-deepening contract. It will deepen an old hole located ½ mile southeast of the Sunflower pool, Lincoln County, Oklahoma, which L. B. Peters of Tulsa recently took over. The test, 1 Whitney, SW SW SE 20-14n-2e, will be

tops in the oil country

Prevents pipe threads from galling and seizing—protects threads—lengthens life of drill string. Those are reasons why 'Bestolife Lead Seal Tool Joint and Casing Compound has been tops in the oil country for 20 years. Unconditionally guaranteed. Sold and exported by supply houses the world over.

I. H. GRANCELL
1601 EAST MADEAU STREET
LOS ANGELES 1, CALIFORNIA

VARCO

TUBING CLAMP

A safety device as well as a universal set of slips, capable of handling tubing, bailers, and small drill collars. Of 2⅜", 2⅞", 3½", 4", and 4½" O.D. Self-aligning inserts with VARCO buttons facilitates maximum gripping surface. Complete within itself. Chrome alloy heat-treated steel.

Abegg & Reinhold Co.

2533 EAST 26TH STREET
LOS ANGELES 58, CALIFORNIA

Houston 10, Texas; Oklahoma City 9; Odessa, Texas; New Orleans 19, La.; Shreveport, La.; Mt. Vernon, Ill.; Casper, Wyo.; Edmonton, Canada. Export: 617 So. Olive Street, Los Angeles 14, Calif.

Working with wire rope?

Fasten it safely with *Genuine*

CROSBY CLIPS

America's largest selling drop-forged wire rope fasteners!

DISTRIBUTORS EVERYWHERE

Sizes for ⅛" to 3" Wire Rope

AMERICAN HOIST & DERRICK CO.
ST. PAUL 1, MINNESOTA

4-WAY LIFTING POWER with this SIMPLEX 310-A EMERGENCY JACK

Powerful 310-A Simplex EMERGENCY JACK is easy operating, will lift vertically or push or lift in any position.

"Get the Simplex" is the call on drilling jobs when men want quick, safe jack action. The double lever socket enables them to work in close quarters and at any angle.

This 15-ton Ratchet Lowering jack will lift or lower from four points—on the rotary cap, on the auxiliary cap shoe, on the serrated toe lift, or from any intermediate height by using the chain as a sling.

4 "POINTS OF LIFT"

Simplex LEVER · SCREW · HYDRAULIC Jacks

SEND FOR BULLETIN: Oil 48

TEMPLETON, KENLY & CO.
1034 S. CENTRAL AVE., CHICAGO 44, ILL.

deepened from 4,898 ft. in the Red Fork, where it was quit early in 1951, to 5,750 ft. for a look at the Wilcox.

Kerr-McGee Industries, Inc., Oklahoma City, has a rig working in the Lima area, Beaverhead County, Montana, where it is drilling for Cities Service Oil Co. at 1 Emerich. The test is scheduled to go to the Tensleep sand, expected around 10,000 ft. Location is in the W½ NW NE 33-14s-7w.

Rogers Oil Co. is the contractor on a wildcat test which Vaughey & Vaughey are starting at a wildcat location, 1 Bennett, 4 miles southeast of the Enders field, in southeastern Kimball County, in the southwest corner of Nebraska.

R. W. Rine Drilling Co., Wichita, Kans., has moved a rig to a rank wildcat location 6 miles west of Dodge City, in Hodgeman County, Kansas, where it will drill for Deep Rock Oil Corp. at 1 Kincaid. Location, in the NW NE SE 34-26-26, is 20 miles southwest of the Purdyville pool, nearest oil production.

L. B. Jackson Co., Tulsa, is drilling at a rank wildcat location in northeastern Beaver County, in the Oklahoma Panhandle. The wildcat, 1 Barby, in the C NW NW 28-6n-26e, is being drilled for L. S. and J. Lee Youngblood, Texas operators, who propose to carry the test to the Mississippian, expected around 7,000 ft.

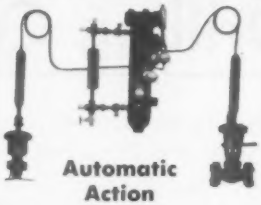
Nuckolls-Bell Drilling Co., Oklahoma City, is drilling for Sampson-Moore Oil Co. at 1 Jennings, a projected 4,200-ft. Bartlesville sand wildcat test, located in the SW NW SE 10-24n-2e, Noble County, Oklahoma.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 7-7-52	Change week ended 6-30-52	Change week ended 7-9-51
Gulf Coast	561	0	− 2
N. & W. Tex.-N. M.	886	−32	− 32
Ark.-N. La.-E. Tex.	146	+ 2	− 16
Oklahoma	311	0	+ 23
Kansas-S. Nebraska	161	− 7	− 1
Illinois-Eastern	156	−17	0
Rocky Mountains	234	− 1	+ 73
Pacific Coast	162	− 1	+ 11
Total U. S.	2,617	−56	+ 56
Western Canada	183	+ 6	+ 42
Total	2,800	−50	+ 98

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Rocky Mountains and western Canada areas are shown on pages 184 and 185.

Boiler Safety Units



Automatic Action

Inferno Feed Water Safety Units provide positive action 3 ways: by holding the water at the proper level, by warning the fireman if the water supply fails, and by cutting off the fires if the warning is not heeded. Sold through supply stores or direct. Write today for free copy of Bulletin 15-B.

The **INFERNO CO.**
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

Standco
NO-SMOKE

STANDCO BRAKE LINING

For the easiest brake known. It feeds off evenly. Standco never scores brake rims. See pages 3608-3613, Composite Catalog.

Standco Brake Lining Co.
HOUSTON

IN STOCK READY TO ASSEMBLE!

STEEL WAREHOUSE SHELVING

Adjustable to convert to any need with bolts. Shelves adjustable on 1 inch centers. Available with backs and doors. Finished in Baked Enamel. Shipped from stock.

STEEL LOCKERS ALSO IN STOCK

SCOTT-RICE COMPANY
610 S. Main Tulsa 3, Okla.

FOUNDRY SERVICE

FOR THE OIL INDUSTRY

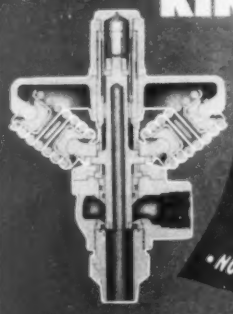
Pouring steel castings at AVONDALE'S Foundry Division

The top quality of SERVICE FOUNDRY work has become famous in the Oil industry.
Expert metallurgical control insures uniformity of quality in casting; expert workmanship in gear cutting and in our machine shop; expert handling throughout the entire SERVICE FOUNDRY operation — from office force to delivery has made our name what it is today!

service foundry — a division of
416 Erato Street, New Orleans 13

avondale marine ways, inc.
P.O. Box 1030, New Orleans 8

KINZBACH
Automatic Mud Relief Valve



- AUTOMATIC RESET
- SNAP ACTION
- NON-CHATTER

The Model 112 operates on working pressures from 750 to 2500 p.s.i. It Snaps Open for instantaneous pressure relief at maximum volume. It Snaps Shut to restore circulation instantly and automatically after a pre-determined pressure drop.

The Model 112 Valve can be used for any mud relief application, including compounding operations.

Write for bulletin 11250.

KINZBACH
TOOL CO., INC.
P. O. Box 277,
Houston, Texas

KINZBACH TOOL CO INC

Export Office:
74 Trinity Place,
New York, N. Y.

just an average-sized cabinet, yet . . .

it holds 4800 well logs!

THE **Kraftbilt**
E-28
ELECTRIC LOG CABINET

Imagine an all-steel electric log cabinet containing eight drawers. Each drawer holds 600 reduced logs filed on edge. Five dividers in each drawer provide easy adjustment for large or small filing sections. This is the Kraftbilt E-28 — an all-steel electric log cabinet custom built to protect logs from wear and dust. Ball bearing rollers, all-welded construction, and easy-slide drawers furnish strength for a lifetime of daily use. The E-28 is truly a new and better approach to an old filing problem.

FOR MORE DETAILS, SEND FOR BULLETIN 352-B, CARE OF,

ROSS-MARTIN COMPANY
BOX 800-M • TULSA 1, OKLAHOMA

DIAMOND ROLLER CHAINS

"GIVE EXCELLENT SERVICE UNDER ALL CONDITIONS"

C. C. SMITH DRILLING CO.
EXPLORATION DRILLING CONTRACTOR
PORTABLE ROTARY AND SPUDDER
DRILLING MACHINES
DIAL 2-3452
P. O. BOX 325
LUBBOCK, TEXAS

October 22nd, 1951

Geo. E. Failing Supply Co.
Enid, Oklahoma

Gentlemen:

Since its inception it has been the policy of the C.C. Smith Drilling Company to use the best equipment possible. The Failing name stands high on our list.

One of the reasons we buy Failing Drills is that we know Failing equipment is made up with high quality parts. As a specific example, the use of Diamond Roller Chains on Failing rigs is important to us because we know Diamond products can be depended upon to give excellent service under all conditions.

Respectfully yours,
C. C. Smith Drilling Co.

By _____ Co-Owner

VHS/cg

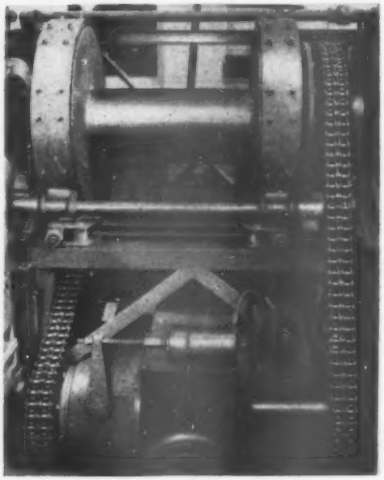
● Experienced oil country men know that the equipment they use is only as dependable as its component parts. Similarly, reputable manufacturers like Geo. E. Failing Supply Co. know that fine performance and long satisfactory service from their equipment depend on quality construction and quality components throughout.

The great preference for Diamond Roller Chains by both driller and manufacturer testifies to their record of matchless performance, durability and economy established by over 30 years of service to the oil industry.

DIAMOND CHAIN COMPANY, Inc.
Dept. 475, 402 Kentucky Avenue, Indianapolis 7, Indiana
Tulsa Office: 2238 Terwilleger Blvd.
Offices and Distributors in All Principal Cities
Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

Diamond Roller Chain Drives on Draw Works, enclosures removed.



Williston Basin Supplement

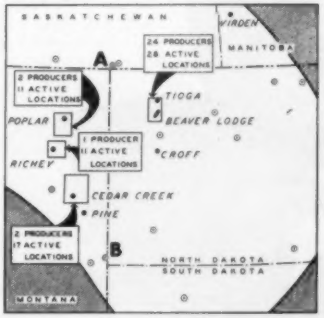
OPTIMISTIC thinking about the potentialities of the Williston basin is still gathering momentum.

The wildcat and development activity on the Nesson anticline is rapidly proving that North Dakota will soon be playing a substantial role in the petroleum industry. The results of widespread wildcats in eastern Montana indicate that development drilling will soon be in full swing in this portion of the Williston basin.

Beginning on page 92 of this issue is a roundup on the Williston basin. Subsequent to the preparation of the story on oil developments, there have been some interesting wildcat tests and field-well completions that further enhance a long-range picture of the significance of Williston.

At B on map is Shell Oil Co. 1 Little Beaver, 50 miles southeast of Shell's Pine unit discovery. This wildcat, located at the extreme southern end of the Cedar Creek anticline, found only small shows of oil on drill-stem tests while digging to a depth of 8,553 ft. However, as is now evident, the carbonate reservoirs in the Paleozoics of the Williston basin don't carry flags where there's oil (production tests following acidization may prove commercial production at intervals where drill-stem tests failed completely) so Shell ran casing in Little Beaver and is now testing. A swab test of perforations at 8,474-8,525 ft. yielded fluid at the rate of 85 bbl. daily (81 bbl. of 30°-gravity oil) after acidization. The wildcat is now being tested up the hole at about 8,350 ft.

Another rank wildcat of special interest is Socony-Vacuum Exploration Co. 1 Ratcliffe in Saskatchewan, just across the border from North Dakota (A on map). This wildcat, now coring ahead toward the objective Devonian, recovered a little free 35°-gravity oil on tests of the Madison at about 6,400 ft. Subsequent tests down to 6,913 ft. found only small shows of oil and gas-cut sulfur water. Shell has staked a wildcat about 12 miles to the east and north of this location as shown on map.



Over in Beaver Lodge, Amerada Petroleum Corp. 1 North Dakota "C," about 8 miles north and east of the discovery and at the extreme north end of the field as originally outlined, has flowed oil and may be classed as an assured extension well. The first dry hole in the field has been completed—Amerada 1 Odergaard on the east side of the field, about 3 miles northeast of the discovery well, drilled to 12,098 ft. without finding production in either the Madison or the Devonian. Up in Tioga, Amerada 1 Skaar has been completed for a 5-mile extension to this area. It flowed 525 bbl. of 43°-gravity oil daily through ¼-in. choke, making the well comparable to the average completions on the Nesson anticline to date.

As yet no oil has been found in North Dakota off the Nesson anticline, but despite a number of dry holes dug since Amerada's discovery in April 1951, there still exist high hopes for the flanks of the basin. In the roundup of the 118,000-sq.-mile Williston basin an estimate of the ultimate recovery of oil from the basin is given as 2½ billion barrels. This estimate may prove ultraconservative—the 90,000-sq.-mile Permian basin, which has oil from the grass roots to basement, has a proved ultimate recovery of 10 billion barrels of oil. So far the Williston basin has failed to indicate commercial production in the shallower and thin Mesozoic sands. However, Jurassic production has been found in Saskatchewan just outside of the Williston basin, and Jurassic rocks within the basin, especially in the eastern and southeastern portions, appear attractive objectives.

Philip C. Ingalls

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MONTANA . . . About 50 miles southeast of Pine Unit Shell Oil Co. has swabbed oil at the rate of 81 bbl. daily at 1 Little Beaver, C NE SW 13-4n-61e, Fallon County, for an apparent new Williston basin discovery on the southern end of the Baker-Glendive anticline.

NORTH DAKOTA . . . Amerada Petroleum Corp. has completed two wells in the Tioga area and one in Beaver Lodge field proper. The most significant completion was the 1 Skaar, 5-mile north extension to the Tioga discovery, which was completed for 525 bbl. of oil daily through ¼-in. choke.

WYOMING . . . Continental Oil Co. completed 10 Unit, wildcat west of present production at West Sussex, for 300 bbl. of oil daily. Production is from Shannon at 2,885-2,990 ft. This is the eighth producing pool in the general Sussex-Meadow Creek area.

WEST TEXAS . . . Dan Auld 1 Corbett, southern Upton County wildcat, flowed oil at the rate of 30 bbl. hourly on drill-stem test in limestone at 6,147-87 ft. Operators believed the zone was in the lower Leonard group. Location is two counties from nearest similar production, as tentatively identified.

"... an expression of faith in the intrinsic soundness of our country."

GEORGE C. BRAINARD
President, Addressograph-Multigraph Corporation

"The purchase of United States Savings Bonds is an expression of faith in the intrinsic soundness of our country, and indicates foresightedness with respect to one's own future needs. Since the inception of the Payroll Savings Plan by Addressograph-Multigraph Corporation in 1942, a large percentage of employees have continuously availed themselves of this safe and convenient method of providing for later benefits."

Every payday nearly seven million men and women—among them a large percentage of Addressograph-Multigraph employees—give substantial expression of their faith in America by putting $140,000,000 into U.S. Defense Bonds.

These seven million payroll savers are not only backing up our country's defense effort—they are providing for their own security . . . helping to combat inflationary pressures . . . and building a reservoir of future purchasing power. How big is the reservoir? On December 31, 1951, the *cash value* of Series E Bonds outstanding was $34,727,000,000—*$4.8 billions more* than the cash value of Series E's outstanding in August, 1945.

Payroll savers are serious savers. Since May, 1951, through April, 1952, E Bonds maturing totaled $2,345,000,000. But, only $593,000,000 of these matured bonds have been presented for payment. 75% of these matured bonds are still held by their purchasers.

As President of one of the first companies to install the Payroll Savings Plan when it was presented to industry in 1942, Mr. Brainard also appreciates the benefits that accrue to a company that has a Payroll Savings Plan with more than 60% employee participation. In company after company, absenteeism has gone down, the accident rate has fallen off and production has gone up as employee participation passed the 60% mark.

What is the percentage of *your* employee participation? If it is less than 60%, get in touch with the Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D.C. Your State Director (listed in telephone books under "Savings Bond Division" as well as "U.S. Treasury Department") will be glad to show you how easy it is to reach 60%, 70%, or higher through a simple person-to-person canvass that puts a Payroll Savings Plan Application Blank in the hands of every employee. Phone, wire or write today.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

THE OIL AND GAS JOURNAL
TULSA 1, OKLAHOMA

Texas Gulf Coast

Distillate Strike Reported In Montgomery County

HOUSTON.—Austral Oil Exploration Co. and Lloyd Smith 1 R. H. Moffatt et al has been reported as a Yegua gas-distillate discovery in Montgomery County 4½ miles north of New Caney. On open flow potential test, well potentialed 18,250,000 cu. ft. of gas per day with gas-liquid ratio of 54,500-1, and 60°-gravity distillate through perforations at 6,318-26 ft. in the Yegua zone. Shut-in pressure registered 2,302 psi. Operators made hole to 7,850 ft. and ran production string to 7,484 ft. Discovery is in the W. S. Taylor Survey, A-545.

Magnolia Petroleum Co. 3 Ethel Cornelius, Matagorda County, turned to tanks after cleaning to pits for 6 hours under tubing pressure of 60 to 150 pounds. On 6-hour test to tanks, well flowed 5.4 bbl. of oil and equal amount of water on 10/64-in. choke under tubing pressure of 70 psi. Final perforations were effected on intervals 9,066-69 ft. with 12 cone shots. Test is located on the J. C. Peyton Survey, A-74.

The Texas Co. 1 Solon L. Reeves et al, Brazoria Co. wildcat 8½ miles northwest of Danbury is making 100 per cent oil at the end of 18-hour test through perforations 10,102-10,112 ft. On test, well was opened on 8/64-in. choke and made oil under tubing pressure of 4,300 psi. On change to 9/64-in. choke, well flowed under pressure of 2,550 psi. and made 90 per cent water and 10 per cent oil. At the end of test, flow tested 100 per cent oil under tubing pressure of 1,500 psi. Hole is bottomed at 11,858 ft. with 7⅝-in. casing at 10,176 ft. Discovery is in Stephen F. Austin Survey 8, A-25.

F. William Carr of Corpus Christi announced location of a 9,000-ft. wildcat as the 1 Paul Wollney, DeWitt County. Drillsite is located on the L. V. Criswell Survey. Nearest production is in Yorktown field, 2 miles northeast of the new location.

Atlantic Refining Co. has squeezed off perforations at 10,368-10,378 ft. at the 1 E. R. Sanders preparatory to reperforating for new test after flow of 50 per cent oil and 50 per cent water on test. On 6-hour test, well flowed 115 bbl. of fluid per day on 10/64-in. choke. Well is in the Caleb Wallace Survey, A-58, 12 miles southeast of Navasota.

Floyd L. Karsten 1 Clifford Chesson, Orange County, has opened new Frio pay. The discovery is bottomed at 7,150 ft. with 5-in. liner cemented to total depth. Well is located in the William Dyson Survey, A-10.

Tex Harvey Oil Co. 1 Theo Quebe has been perforated at 7,577-84 ft. in attempt to confirm production in the area. On drill-stem test 7,580-7,600 ft., recovery was 3,100 ft. of pipe-line oil and 456 ft. of salt water. Second test at 7,591-7,600 ft. made 3,275 ft. of oil and 640 ft. of salt water. Location is in the Stephen F. Austin Survey, Washington County.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Colorado County: Brazos Oil and Gas Co. 1 W. A. Struss, J. S. Whitman Sur., A-600, dry, TD 11,503 ft.

Magnolia Petroleum Co. 1 Gracey-Wegenhoft, Jas. Nelson Sur., A-35, dry, TD 14,381 ft.

Fort Bend County: Fort Bend Oil Co. 1 J. M. Moore Est., Antonio Balle Sur., dry, TD 9,536 ft.

Goliad County: Lee Bros. Oil Co. 1 A. C. Dohmann, L. Fulton Sur., dry, TD 5,189 ft.

Harris County: M. T. Halbouty & Moody Bros. 1 S. Texas Nat. Bank Tr., Callahan & Vance Sur., dry, TD 8,379 ft.

Karnes County: Harris S. Stahl 1 Vincent Lyssy, Bartlett Hickman Sur., dry, TD 3,990 ft.

Refugio County: G. E. Sullivan 1 Mrs. Phil Hynes, Walter Lambert Sur., dry, TD 6,517 ft.

Tyler County: Humble Oil & Gas Refining Co. 1 C. Wm. Rice Institute, G&BN Co. Sur., A-334, dry, TD 10,499 ft.

Walker County: Woodley Petroleum Co. & Stanolind Oil & Gas Co. 1 Jessie Heath et al, James W. O'Bannon Sur., A-423, dry, TD 5,780 ft.

Wharton County: Johnson & Appling 1-E Kountze & Stewart, L. L. Miller, A-528, dry, TD 6,903 ft.

Magnolia Petroleum Co. 1 Carl Reynolds, Jos. Newman Lge., A-48, dry, TD 14,974 ft.

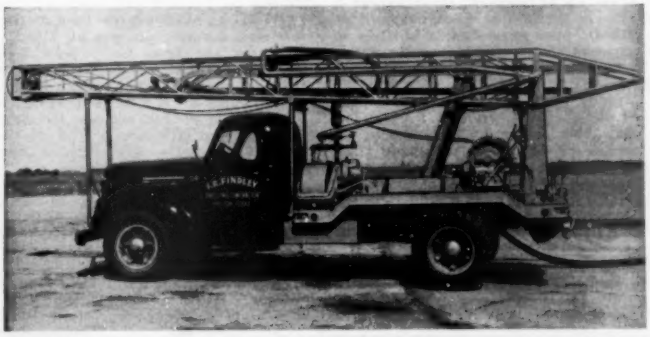
Waller County: Brazos Oil & Gas Co. A-1 Mrs. Corrine Connell, Owen Wingfield heirs, A-269, dry, TD 11,167 ft.

Eastern Texas

Two Tests Slated For Cherokee County

DALLAS.—Cherokee County this week drew two more exploratory tests, one scheduled to 10,000 ft. and the other to 4,800 ft.

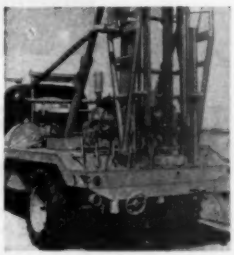
The deeper of the two is Frank and George



FRANKS KC 38-S Is *BUILT*

FOR SEVERE SHOCK IN HARD DRILLING OF SHOT HOLES, CORE DRILLING AND WATER WELLS

Franks Model KC 38-S is designed for hard drilling in loose boulder and rock formations. Materials are made of the highest quality. Shafts are high alloy heat treated steel and are ground finished. Standard makes or parts are used throughout to facilitate repairing. The KC 38-S is equipped with a 10 ft. mechanical pull-down feed mechanism for use in hard formations. A jaw clutch arrangement permits gravity feed drilling. This makes it ideal for shot-hole, core drilling and water well work having a capacity of 1000 ft. using 2⅜" tool joint drill pipe. The KC 38-S weighs 10,000 lbs. less truck.



MODEL KC 38-S DRILL

Chain drive power takeoff, capable of transmitting entire horsepower of engine under all conditions.

Rotary table has 5¼" opening, heavy duty bearings, oil bath type.

Free spooling, double drum draw works, equipped with jaw clutches; 10,000 lbs. single line pull capacity. Mud pump—Gardner-Denver FXG 4½ x 6.

Write today for complete specifications and information on the Franks Heavy Duty Model KC 38-S Drill.

Franks MACHINE CO.

205 East Maine Enid, Okla.

Exclusive Export Distributor
ACME WELL SUPPLY COMPANY
19 Rector St. New York City

Frankel 1 A. H. House, located ¾ mile southwest of Ironton townsite, in the N. J. Steincipher Survey. The shallow test is Wise and Decker 1 W. E. Pierce, on a 37-acre lease in the T. J. Rusk Survey, 3 miles northeast of Tecula.

A new wildcat for Houston County is to be drilled by Marine Gathering Co. as the 1 J. C. Merriwether. Location for the 7,500-ft. test is ¼ mile east of Kennard in the John Box Survey.

In Grayson County Big Mineral Creek field was to receive another deep test. Shell Oil Co. planned to deepen its 1 T. D. Green to 11,000 ft. Location is in the E. C. Smithson Survey, and elevation is 645 ft.

In Leon County, Magnolia Petroleum Co. 1-A Swift Estate, west of Kickapoo, had drilling under way on a 7,500-ft. contract.

In Cherokee County, a third Woodbine gas well for the Sessions field was in prospect at Texas Eastern Production Co. and R. J. Caraway 1 J. W. Summers. Gas was gaged at the rate of 1,250,000 cu. ft. daily through ¼-in. choke, from perforations at 4,421-24 ft. Completion was to be made from that section. The well had been drilled to 8,923 ft. and plugged back.

Another Pettit oil producer on the southwest flank of Carthage gas field, Panola County, was assured at Arkansas Fuel Oil Co. 1 Green Ritter, 2 miles west of Gary. The well flowed 249 bbl. of oil a day through ¼-in. choke, with gas-oil ratio of 1,150 cu. ft. from perforations at 6,076-91 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Harrison County: Delta Drilling Co. 1 Bartlett & Bailey, C. Yarborough Sur., A-816, dry, TD 7,005 ft.

Houston County: Superior Oil Co. 1 Dan Hartt, J. Forbes Sur., A-32, dry, TD 10,711 ft., elev. 276 ft.

Morris County: B. G. Byars 1 Paul Pewitt, G. Dyer Sur., dry, TD 4,700 ft.

Shelby County: Arkansas Fuel Oil Co. 1 J. S. Balkom, J. Sullins Sur., A-636, dry, TD 6,600 ft., elev. 355 ft., Paluxy 3,370 ft., Glen Rose (Texas), 3,640 ft., Glen Rose (Louisiana), 4,427 ft., James 5,835 ft., Pettit 6,093 ft.

Smith County: L. A. Grelling 1 J. A. Hammonds, S. Brimberry Sur., A-69, dry, TD 4,300 ft., Woodbine 4,074 ft.

North-Central Texas

New Bend Discovery Seen For Montague

WICHITA FALLS.—A new Bend conglomerate discovery was seen for Montague County at The Texas Co. 1 John Ulbig, Section 6, MEP&P, 4 miles northeast of Montague.

A drill-stem test at 6,228-38 ft. had gas in 7 minutes and oil in 90 minutes. The testing tool was closed in 7 minutes, at which time the well was gaging oil at the rate of 15 bbl. an hour.

Completion was reported for Joe Reznick 1 Mrs. Mitchell, conglomerate discovery 3½ miles southwest of Belcherville. Daily potential was 121.6 bbl. of oil a day through ¼-in. choke from vay at 5,731-51 ft.

Jack Grace Production Co. will drill 3 M. B. Ritchie as a confirmation test to the 1 Ritchie, recent conglomerate discovery 2 miles south of Belcherville. The 3 Ritchie has been contracted to 5,725 ft. and location lies in Block 65, M. Garnett Survey.

In Clay County, S. D. Johnson was moving in to drill 1 L. T. Burns, Trustee, as a 5,200-ft. wildcat. Location is 2½ miles west of Shannon in the J. Robbins Survey.

In Archer County, Lewis W. Welch planned to drill 1-B Abercrombie as a confirmation test to the 1-A Abercrombie, Mississippian discovery recently completed. Contract depth on the 1-B was 5,5000 ft. and location is in Block 89, Harris Subdivision of Club Ranch.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Shackelford County: Clyde R. Davis 1 G. R. Davis, 13-9-T&P, TD 1,632 ft., pay 1,621 ft., IP pumped 80 bbl. 37°-gravity oil.

Stephens County: Woodson Oil Co. 1 Robt. Brown, H. Cleveland Sur., A-42, TD 4,302 ft., pay 4,271 ft., IP 200 bbl. 42°-gravity oil, 10/64-in. choke, TP 1,425 psi., GOR 1,575 cu. ft.

Woodson Oil 1 J. R. Hill, Sec. 1,022, TE&L, TD 4,290 ft., elev. 1,147 ft., Mississippian pay 4,280 ft., IP 138 bbl. 42°-gravity oil, 10/64-in. choke, TP 400 psi., GOR 775 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: E. B. Clark 2 Mary Ann Garvey, Blk. 66, J. W. Harris Subd., dry, TD 1,499 ft.

Luke Grace Drilling Co. 1 L. A. Evans, SPRR Sur., A-432, dry, TD 5,896 ft.

Morgan Bros. 1 Ferguson, SPRR Sur., A-416, dry, TD 552 ft.

R. W. Place 1 DeBees, Sec. 2, SPRR, dry, TD 667 ft.

C. P. Thurkill 1 J. L. Prideaux, Blk. 1,867, TE&L, dry, TD 905 ft.

Brown County: Connally & Jackson 4 Stone, 63-41-A. D. Neill Sur., dry, TD 1,040 ft.

Padre Petroleum Co. 1 Walter Taber, Blk. 9, Jeremiah Brown Sur. 137, dry, TD 2,981 ft., elev. 1,530 ft., Caddo 2,030 ft.

Callahan County: Morris Mizell 1 J. D. Windham, Sec. 385, Geo. Hancock Sur., dry, TD 4,000 ft.

Coleman County: Blackwell Oil & Gas Co. 1 Ashmore, Blk. 285, Martin Strouse Sur., dry, TD 1,500 ft., elev. 1,513 ft., Caddo 1,450 ft.

O. F. Darling and H. C. Arnold 1 J. J. Porter, G. E. Harrison Sur. 255, dry, TD 2,466 ft.

Patrick A. Doheny 1 J. L. Wilkinson, 3-2-GH&H, dry, TD 3,551 ft.

Carl Hovgard 1 Rob O'Hair, Sec. 710, J. H. Grimes Sur., dry, TD 3,219 ft.

Cooke County: Sussex Oil Co. 1 J. A. Dennison, Z. Whiteside Sur., dry, TD 2,815 ft.

Eastland County: Connally-Jackson 1 Walker Est., 87-3-H&TC, dry, TD 3,530 ft., elev. 1,616 ft., Caddo 3,088 ft.

Fisher County: Gem Oil Co. 1 E. Martinez, 162-2-H&TC, dry, TD 7,211 ft.

W. T. Waggoner Est. 1 P. J. Malcut, 111-2-H&TC, dry, TD 5,067 ft.

Haskell County: Humble Oil & Refining Co. 1 Dora Foster, Blk. 4, J. D. Whitten Sur., dry, TD 6,106 ft., elev. 1,654 ft., Saddle Creek 2,550 ft.

Noel Pautsky 1-B C. J. Kleiner, Blk. 57, J. M. Cass Sur., dry, TD 3,029 ft., elev. 1,451 ft., reef 2,834 ft.

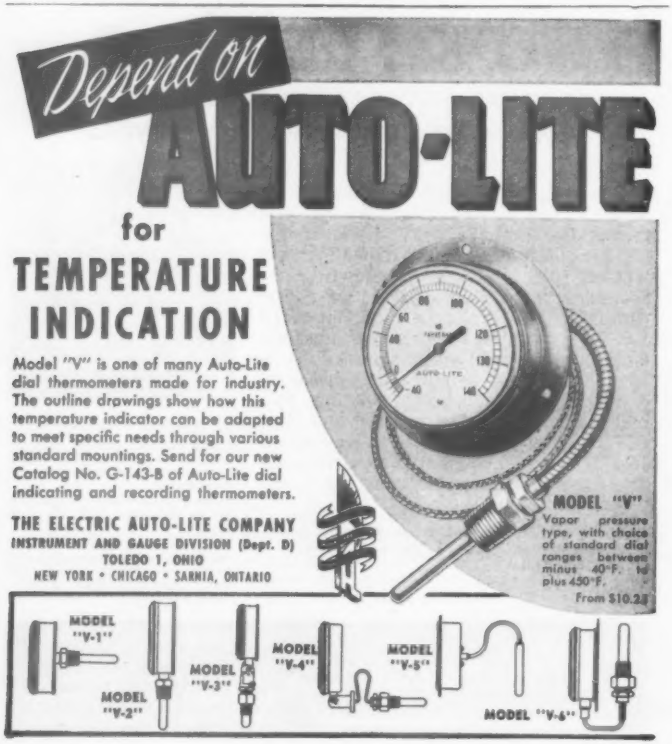
Jack County: Biggerstaff & Gordon 2 H. E. Voyles, E. Smith Sur., A-524, dry, TD 560 ft.

Russell Maguire 1 Van Wert, J. E. Hopkins Sur., A-254, dry, TD 5,311 ft.

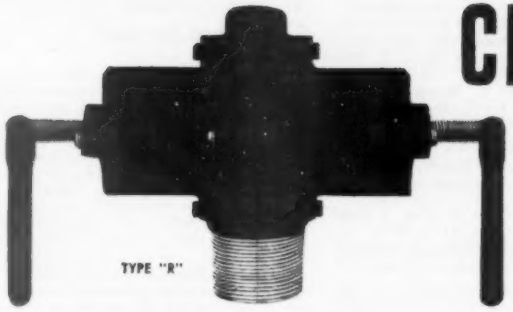
John L. McMahon Jr. 6-A J. T. Roney, Sec. 3,327, TE&L, dry, TD 421 ft.

McMahon Jr. 7-A Roney, Sec. 3,327, TE&L, dry, TD 410 ft.

Jones County: W. E. Butler 1 Union Central


Depend on
AUTO-LITE
for
TEMPERATURE
INDICATION
Model "V" is one of many Auto-Lite dial thermometers made for industry. The outline drawings show how this temperature indicator can be adapted to meet specific needs through various standard mountings. Send for our new Catalog No. G-143-B of Auto-Lite dial indicating and recording thermometers.
THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION (Dept. D)
TOLEDO 1, OHIO
NEW YORK • CHICAGO • SARNIA, ONTARIO
MODEL "V"
Vapor pressure type, with choice of standard dial ranges between minus 40°F. to plus 450°F.
From $10.25
MODEL "V-1"
MODEL "V-2"
MODEL "V-3"
MODEL "V-4"
MODEL "V-5"
MODEL "V-6"

CLEAN FLOOR SAFE DERRICK



TYPE "R"

TYPE "S"

TYPE "D"

TYPE "B" RELEASING ATTACHMENT

GUIBERSON *Wire Line Oil Savers*

for Excellent Pack-Off—Clean, Dry Line

3 to choose from—take your choice and know that if it's Guiberson, it's *good!*

TYPE "R"—for tubing. Simple, inexpensive, effective. Split housing for easy installation.

TYPE "S"—for casing or tubing. Economical, simple—similar to "R" but heavier construction, flange bottom or tubing connection.

TYPE "D"—for tubing or casing. Two independent sets of rubbers, single end operation, make it cost more but still very economical. Pin or flange adapter connection.

Non-sparking brass bushings and guides throughout . . . long-wearing rubbers . . . finest Guiberson precision construction.

TYPE "B" RELEASING ATTACHMENT—Positive release for Oil Savers—prevents tool damage.
Easy to attach, pressure won't release it.

Better Be Safe Than Sorry!

THE GUIBERSON CORPORATION

Life, 47-18-T&P, dry, TD 3,150 ft.
Hack Drilling Co. 1 O. L. Caton, Sec. 9, D&DAL Sur., dry, TD 3,402 ft.
Robinson-Puckett, Inc. et al 1 Mintie Brown, 16-1-T&NO, dry, TD 4,362 ft.

Montague County: Bay Petroleum Corp. 1 E. E. Johnson, R. T. Biggar Sur., dry, TD 6,592 ft.

Nolan County: Lamar Hunt 1 R. B. Jones, 175-1A-H&TC, dry, TD 7,300 ft., elev. 2,505 ft., Strawn 6,476 ft., Caddo 7,015 ft., Mississippian 7,094 ft., Ellenburger 7,157 ft.

Shackelford County: Roeser & Pendleton 1 Etta Reilly Nail, Wm. Woodward Sur. 50, dry, TD 4,610 ft., Caddo 4,025 ft., conglomerate 4,239 ft., Ellenburger 4,555 ft.

Stephens County: Grace Drilling Co. 1 Black Bros., 28-4-SPRR, dry, TD 4,555 ft., elev. 1,213 ft., Strawn 2,190 ft., Caddo 3,352 ft., Mississippian 4,405 ft.
Wittmer Knight & Ewing 1 Fred Tomlin, 27-8-T&P, dry, TD 4,387 ft.

Throckmorton County: Jones & Stasney 2 M. B. Gentry, Sec. 73, CIR Sur., dry, TD 4,852 ft., Mississippian 4,823 ft.
Tom B. Medders 1 Susie Tuton, A. Leyo Sur., dry, TD 4,342 ft.

Wichita County: N. S. Nelson 1 W. T. Waggoner, 27-5-H&TC, dry, TD 1,986 ft.

Wilbarger County: M. W. Blair 1-A Waggoner, 34-4-H&TC, dry, TD 2,504 ft., Noble 2,380 ft., Milham 2,434 ft.

Young County: R. W. Darden 4 Joe Hunt, Blk. 185, TE&L, dry, TD 1,030 ft.
Rankin & Pitcock 2 B. W. King, J. Poitevent Sur., A-228, dry, TD 4,046 ft.
Wright, Clark & Senkel 1 J. E. Morrison, Sec. 1,922, TE&L, dry, TD 3,760 ft.

THOMAS Flexible ALL METAL COUPLINGS

FOR POWER TRANSMISSION • REQUIRE NO MAINTENANCE

REFINERS! PIPE LINE MEN! DRILLING ENGINEERS! LABORATORY TECHNICIANS!

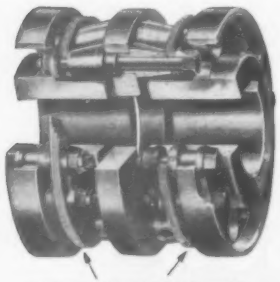
All can use Thomas Couplings to their advantage on Pumps, Compressors, Cooling Towers, Rigs or any tough job where continuous operation and dependability are required.

Specialists on Couplings for more than 30 years

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

BACKLASH FRICTION WEAR and CROSS-PULL are eliminated
Lubrication is not required!



PATENTED FLEXIBLE DISC RINGS

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

• • •

NO MAINTENANCE PROBLEMS.

• • •

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Southwest Texas

Willacy Wildcat Completed For Gas

CORPUS CHRISTI.—The Texas Co. 7 Yturrio Land & Cattle Co. gas discovery wildcat, 3½-miles northwest of Santa Margarita in Willacy County, was completed with calculated open flow of 6,700,000 cu. ft. of gas per day. Hole was carried to total depth of 10,515 ft. with 7-in. production string cemented on bottom. Production is from perforations in the Frio formation at 9,900-27 ft. Discovery is in the "San Juan de Carricitos" Jose Narciso Cabazos Grant, A-8, Share 4.

Spartan Drilling Co. 1 Chas. I. Lovett is a new sand discovery in San Patricio County. On drill-stem test on the interval 6,660-75 ft., recovery was 125 ft. of oil and gas mud with 50 per cent being oil. On previous drill-stem test on the interval 6,653-60 ft., recovery was 140 ft. of oil slightly cut with mud. Location of discovery is on the Welder and Odem Subdivision, Block 3-A.

L. M. Josey 1 A. F. Beidler estate is a new wildcat for Kinney County. Location is in the Meliton Valdez Grant. It has been reported that this test will be drilled to 4,000 ft. or to metamorphic rocks.

Killam and Hurd of Laredo have staked location for the 1 Maximo Vera 4,800-ft. wildcat test 2 miles south of the Gordon discovery well in Duval County.

Martin, Shelly and Thomas have abandoned the 2 C. L. Downey as a dry hole at a depth of 2,508 ft. A section from 1,832-77 ft. was cored but no commercial shows were indicated. Location is on Noah Scott Survey, 1,470 ft. south-southeast of 1 C. L. Downey, dry hole drilled to a total depth of 2,009 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

Hidalgo County: Taylor Refining & Mayfair Minerals 1 Lester Dayley unit, John Closner S/D Lot 8, Blk. 13, TD 10,994, prod. zone Marks, perf. 9,736-9,920 ft. IPF open flow 43,500,000 cu. ft. gas per day, 50.6° gravity, gas-oil ratio 55,000-1.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Calvert, Cochran & Manly 1 Hilda Schuh, Wm. Johnson Sur. 228, dry, TD 6,628 ft.
Calvert, Cochran & Manly 2 Hilda Schuh, Wm. Johnson Sur. 228, dry, TD 2,591 ft.
Calvert, Cochran & Manly 1 Edwin Thane, Wm. Johnson Sur., dry, TD 2,486 ft.
R. D. Mebane 1 D. D. Hernin, Carlos Peres Sur. Sec. 1041, dry, TD 8,195 ft.

Jim Hogg County: Sid Katz & R. H. Venable 3 Mary E. Premont, E. R. Jensen Sur. Sec. 158, dry, TD 4,400 ft.

Kennedy County: Humble Oil & Refining Co. 1 Laguna Madre St. Tr. 249, St. Tr. 249 Laguna Madre, dry, TD 11,695 ft.

Starr County: Lipscomb & Ferrando 1 H. P. Guerra, AB&M Sec. 95, dry, TD 4,500 ft.

Travis County: Anderson-Prichard Oil Corp. 1 Nat Erickson, Peter C. Harrison Sur. dry, TD 1,488 ft.

Webb County: Brigh & Schiff 1 J. O. Walker, Jose Borrego Grant, dry, TD 1,674 ft.
Sid Katz et al 3 S. Benavides Est., BS&F Sur. Sec. 703, dry, TD 2,725 ft.
Orlee Oil Co. and Ed W. Dawson 1 Puig Bros., Albercas de Arriba Grant, Blk. 29, dry, TD 3,293 ft.

South Louisiana

New Distillate Reservoir Reported In Ascension

NEW ORLEANS.—The Texas Co. and Ashland Oil and Refining Co. 3 Guliuzzo unit 2, Ascension Parish, has been reported as a new gas-distillate reservoir for Darrow field. Well flowed at the rate of 2,500,000 cu. ft. of gas plus 60 bbl. of 52°-gravity distillate through perforations at 8,865-79 ft. on a 12/64-in. choke. Tubing pressure was 3,340 psi. with casing sealed. Test was drilled to a total depth of 9,232 ft. with 7-in. casing cemented at that point. New discovery lies in Section 49-10s-2w.

Helis Petroleum Co. 1 Slack Bros., 7-7s-10e, Iberville Parish, reported a final gage of 124.89 bbl. of 36.7°-gravity oil plus 171,000 cu. ft. of gas daily through ⅛-in. choke. Well bottomed at 9,900 ft. with 7-in. casing set at 9,701 ft. and 2½-in. tubing swung at 9,156 ft, flowed through perforations at 9,157-84 ft. Tubing pressure of 1,120 psi. was recorded with gas-oil ratio of 1,369 to 1.

Gulf Refining Co. 1 Martha DeRouen, Calcasieu Parish has been cemented at 11,540 ft. In 4 hours, through perforations at 11,370-11,378 ft., well flowed an unestimated amount of gas and mud on ⅛-in. choke with tubing pressure 3,700 psi. Operator then changed to 10/64-in. choke and in 1 hour well made a spray of oil. Operator has now killed the well and is waiting on cement after squeezing the perforations. Well is located in Section 15-11s-6w.

William Helis est. 1 State Lease 1,762, Plaquemines Parish, has been completed as a new gas-distillate discovery through perforations from 9,416-32 ft. for 10 bbl. of distillate plus 2,225,000 cu. ft. of gas daily. The 10,551 ft. well, with 7-in. casing cemented at that point, flowed on 12/64-in. choke with tubing pressure of 3,600 psi.

SOUTH LOUISIANA WILDCAT FAILURES

Calcasieu Parish: Houston Oil Co. of Texas-American Republics Corp. 1 Lutcher-Moore Lumber Co., 14-8s-12w, dry, TD 7,514 ft.

Evangeline Parish: Howard S. Cole, Jr. 1 Ulyses Young, 3-5s-2e, dry, TD 11,691 ft.

Canadian Fields

Devonian Discovery Seen For Alberta

CALGARY.—Canadian Gulf Oil Co., major explorer and developer in the Big Valley-Fenn-Stettler area, has made another Devonian oil discovery in that general region of central Alberta, at a wildcat about 85 miles northeast of Calgary.

The new oil discovery well is Gulf-CPR 9 McAlister, on LSD 9, 35-35-20w4, about mid-way between the 7 mile stretch separating Big Valley and Fenn oil fields which were also discovered by Canadian Gulf.

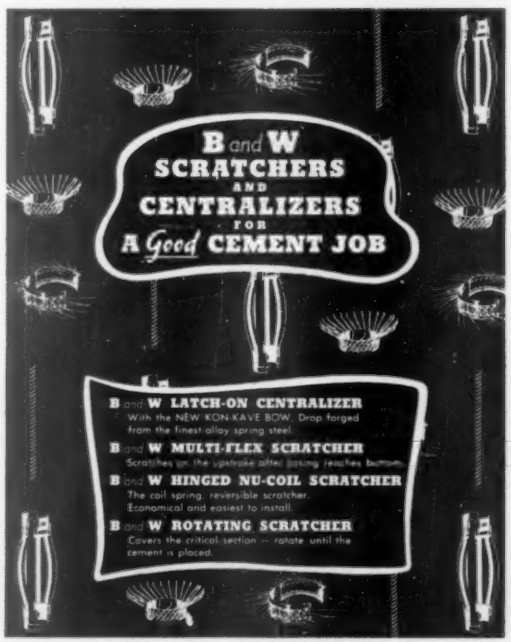
The McAlister discovery well has so far indicated a 26-ft. oil pay section, and coring and testing is being continued. Initial drill-stem test in top of D2 zone was run from 5,252-5,270 ft. for 1 hour. Natural gas flowed to surface in 5 minutes, and oil in 19 minutes, at rate around 35 bbl. hourly. Two later tests, flowed oil at rates of 1,200 bbl. daily, and testing is now under way at bottom 5,301 ft.

Canadian Delhi Oil, Ltd., has indicated another gas discovery at the Winchell Coulee area wildcat that discovered wet gas in the Cardium sand during early March of this year. The dual zone gas strike is located 35 miles northwest of Calgary.

The discovery well is Delhi-Britalta 1 Winchell Coulee on LSD 10, 24-29-6w5, about 27 miles west-northwest of Crossfield and approximately that same distance southwest of Didsbury. This second gas discovery was indicated after bit had penetrated the top of the Jumping Pound sand, as gas commenced bubbling through the mud. Crew spent about 4 days conditioning mud in an effort to keep the well under control, and production string of casing has been set due to extremely high formation pressures. Hole is currently bottomed at 8,455 ft., around 15 ft. into the Jumping Pound sand, and perforations will be carried out for production tests, as drill-stem tests were not possible.

A perforation and testing program currently underway at the Federated-United 14-2 Nevis wet gas discovery well has indicated that an additional 20 ft. of gas pay zone are present in the top of the D2 zone of Devonian. Total thickness of gas pay in the D2 and D3 zones at this discovery well has been boosted to approximately 195 ft.

D2 top is 5,279 ft., or 2,704 ft. subsea. On the basis of latest perforated interval, it is believed that the gas pay zone was encountered near top of D2, and went down to about 5,500 ft. where water and oil were found. In that zone, some 195 ft. were pro-


B and W
SCRATCHERS
AND
CENTRALIZERS
FOR
A Good CEMENT JOB
B and W LATCH-ON CENTRALIZER
With the NEW KON-KAVE BOW. Drop forged from the finest alloy spring steel.
B and W MULTI-FLEX SCRATCHER
Scratches on the upstroke after casing reaches bottom.
B and W HINGED NU-COIL SCRATCHER
The coil spring, reversible scratcher. Economical and easiest to install.
B and W ROTATING SCRATCHER
Covers the critical section — rotate until the cement is placed.

GULF COAST
P. O. Box 5366
Houston 12, Texas
WE-ntworth 8603

B and W Incorporated

WEST COAST
5545 Cedar Avenue
Long Beach 7, Calif.
Long Beach 4-8366

Are your **OIL INVESTMENTS**
Closely Held or
Family Owned?

We specialize in the making of oil loans and advising on the financial problems of independently owned oil and gas producing properties.

C. LESLIE RICE
Vice President

J. F. DOUGHERTY
Vice President

Oil Department

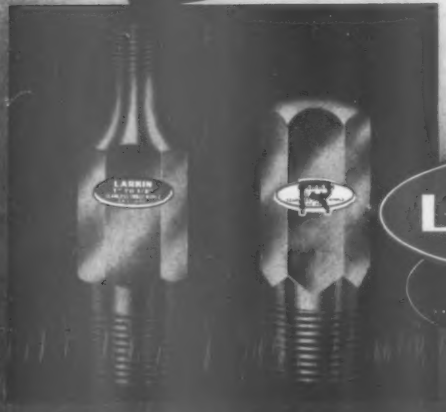
Empire Trust Company
7 WEST 51st STREET
at Rockefeller Center, New York, N. Y.

Uniform
STRENGTH
SIZE
FINISH

Larkin Forged Steel Swage Nipples and Bull Plugs are absolutely uniform in every respect and make your hook-up job easier, faster, safer.

Be sure you use only the very best all the way through—Specify Larkin every time.

1. **Seamless and weldless construction.**
2. **Made from new, full-weight material.**
3. **Accurate threads—beveled for easy starting.**
4. **Square faced ends.**
5. **Chamfered inside edges.**
6. **Ample tong space.**
7. **Rustproof Zincoting for threads and body—inside and out.**
8. **Packaged in damage-proof cartons for shipping and storing.**



* Larkin Hexagonal Swages and Bull Plugs for easy hookup with open end wrench.

* Larkin Bull Plugs and Swage Nipples in Sizes 2" and under are available in SAE 8620 steel. (Refinery Alloy)

LARKIN

...Through Your Supply Store

LARKIN
PACKER COMPANY, INC.
ST. LOUIS, MO.

ductive of water-free wet gas, with some sections in that zone being unproductive.

Light gravity crude oil was encountered in the lower portion, but formation water was also present, and that lower zone is termed non-commercial. Flows of wet gas, estimated up to 20,000,000 cu. ft. per day were recorded during drill-stem tests. Production and potential tests are now under way.

CANADIAN WILDCAT FAILURES

Amurex-Trans Empire 1 Kading, LSD 11, 7-24-12w4, TD 3,313 ft.

Continental 1 Princess, LSD 7, 31-21-12w4, TD 3,995 ft.

Great Plains 15-22, LSD 15, 22-37-24w4, TD 6,654 ft.

Permian Basin

Crockett Ellenburger Strike Completed

MIDLAND.—Crockett County had two discoveries completed at week's end, one an Ellenburger flowing well and the other a pumper from the Wolfcamp.

Lion Oil Co. 1 Shannon, between Strawn production in Todd field, and shallower production in the Vaughn area, completed as an Ellenburger discovery with a flowing potential of 192 bbl. of 38°-gravity oil a day through 18/64-in. choke from perforations at 7,380-7,413 ft. Top of pay was 6,936 ft. on elevation of 2,660 ft. Importance of the strike may be determined in how it correlates, structurally, with the prolific Elkhorn-Ellenburger field to the northeast.

In central Crockett County Deep Rock Oil Corp. 1 Shannon completed as a Wolfcamp discovery from perforations at 5,866-72 ft., for a daily potential of 135.7 bbl. of 34°-gravity oil. Location is 3½ miles east of Noelke field which produces from the Permian.

The Texas Co. has filed application to drill its 1-Z State, in northeast Andrews County, to 14,000 ft. to test the Ellenburger, and at last report was below 12,820 ft. The well showed for a Devonian discovery when drill-stem test at 12,595-625 ft. recovered 1,272 ft. of oil, and a second test at 12,620-50 ft. developed 1,742 ft. of oil.

Magnolia Petroleum Co. had location made for a ½-mile south offset to its 1-36 University, Andrews County discovery and deepest in the Permian basin. The new well will be 1-36-994 University in Section 17. Projected depth is 14,500 ft.

Additional exploration work in the Ellenburger included Humble Oil & Refining Co. 1-K Sawyer Cattle Co., 18 miles northeast of Big Lake in Reagan County. Proposed depth is 10,000 ft. and location spots 5½ miles east of Humble 1 Sawyer which was dry at 9,995 ft., and about the same distance northeast of 1-D Sawyer which was dry at 9,810 ft. Drilling of the new project will await pipe delivery.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Coke County: Humble Oil & Refining Co. 1 Rawlings, 397-1A-H&TC, TD 5,820 ft., Strawn pay 5,298 ft., IP 298 bbl. 49°-gravity oil, 3/16-in. choke, TP 250 psi., GOR 179 cu. ft.

Crane County: Bryan Hoff & Brinsmere 1 H. R. Henderson, 4-B26-PSL, TD 3,651 ft., elev. 2,790 ft., pay 3,500 ft., IP pemped 61 bbl. oil.

King County: Continental Oil Co. 1 M. C. Ross, 97-13-H&TC, TD 6,385 ft., elev. 1,640 ft., Caddo pay 5,638 ft., IP pumped 133 bbl. oil.

Upton County: Sinclair Oil & Gas Co. 1 TXL, 19-41-T5S-T&P, TD 11,915 ft., elev. 2,864 ft., Pennsylvanian 10,173 ft., IP pumped 55 bbl. 43°-gravity oil.

Sinclair 1 University 126, 13-4-University, TD 11,748 ft., elev. 2,960 ft., Wolfcamp 8,075 ft., IP 426 bbl. 41°-gravity oil, 20/64-in. choke, TP 550 psi., GOR 373 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Gulf Oil Corp. 1-LLL Texas, TD 13,070 ft., elev. 3,151 ft., Devonian 10,886 ft., Mississippian 10,360 ft., Ellenburger 12,794 ft., dry in lower horizons, completed as 118-bbl. oil well at 4,680 ft. and assigned to North Cowden field.

Crane County: Lloyd H. Smith, Inc. 1 Barnsley, 34-32-PSL, dry, TD 4,820 ft., elev. 2,512 ft., Tubb 4,542 ft.

Ted Weiner 1-19 A. H. Scott, 19-B20-PSL, dry, TD 4,049 ft., elev. 2,580 ft., Glorietta 3,926 ft.

Crockett County: J. L. Boyd 1 J. M. Shannon, 37-BB-TCRR, dry, TD 2,735 ft.

Curtis R. Inman 1 E. F. Noelke, 48-31-H&TC, dry, TD 1,395 ft.

Powell-McFarland 1 A. E. Luckett, 8-CD-BB&C, dry, TD 1,350 ft.

Kimble County: Aztec Oil Co. 1 J. S. Farmer, 14-3-GH&SA, dry, TD 4,100 ft., elev. 2,241 ft., Ellenburger 3,460 ft.

Pecos County: Standard Oil Co. of Texas

GRANT REAMER CUTTERS are angled to the right. Therefore, the Reamer will not thread itself into tight hole, and assures desirable shearing-cutting action as well as round, full-gauge hole.

Now—you get *longer wearing life than ever before* with the Grant Reamer since all parts subject to wear are component parts of the cutter assemblies. Thus, simply changing cutter assemblies renews the entire tool. *No welding is required in the manufacture or maintenance of the Reamer body, eliminating the need for shop repairs.*

Proven Grant Tools—Used Where Performance Counts

Hydrostatic Bailers	Bulletin No. 11
Liner Pullers	Bulletin No. 14
Pressure Releases	Bulletin No. 15
Hydraulic Expansion Casing Scrapers	Bulletin No. 17
Rotary Underreamers	Bulletin No. 24
Cable Tool Underreamers	Bulletin No. 27
Hole Enlargers	Bulletin No. 38
Reamers	Bulletin No. 43-A
Hydrostatic Perforation Cleaners	Bulletin No. 50
Dump Bailers	Bulletin No. 51
Roller Cutter Shale Bits	Bulletin No. 54
Sand Pumps	Bulletin No. 55
Well Cleanout Procedures	Bulletin No. 57
Wall and Bottom Hole Scrapers	Bulletin No. 58
Vertical Casing Scrapers	Bulletin No. 59

Write for Descriptive Bulletins on these Grant Tools

GRANT OIL TOOL COMPANY

Main Office and Plant
2042 E. Vernon, Los Angeles 58, Calif.
Branches Throughout California and The Mid-Continent

Subsidiary MacClatchie Manufacturing Company

1-2 Wilson, 12-Z-TCRR, dry, TD 9,396 ft.

Reagan County: Southwest Natural Producing Co. et al 1 Cope, 36-A-TCRR, dry, TD 6,002 ft., elev. 2,490 ft., Spraberry 5,030 ft.

Runnels County: J. W. King 1 R. H. Herring, Sec. 37, H&GN, dry, TD 4,850 ft., elev. 1,801 ft., Caddo 4,496 ft., Ellenburger 4,842 ft.

Schleicher County: Anton Oil Corp. 1 Mrs. H. M. Reynolds, 13-A-GC&SF, dry, TD 7,972 ft.

TEXAS PANHANDLE (DISTRICT 10) SUCCESSFUL WILDCAT

Roberts County: Gulf Oil Corp. 2 Haggard, 5-2-I&GN, 8 miles NW Miami, TD 4,033 ft., pay 4,009-33 ft., IP 442.28 bbl. 47° gravity oil a day, GOR 11,958 cu. ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURE

Ochiltree County: J. M. Huber 1 Froese, 19-JT-TWNG, 12 miles SW Perryton, dry, TD 8,770 ft., elev. 3,008 ft.

SOUTHEAST NEW MEXICO

Amerada Petroleum Co. 1-MB State, Pennsylvanian discovery offsetting a Devonian discovery, developed flowing oil from the Devonian on drill-stem test. On the approximate 3-hour test at 10,540-600 ft., in the Devonian, gas surfaced in 49 minutes and oil in 53 minutes. In 2 hours the well gaged 206.47 bbl. of oil. A previous test in the Devonian from 10,480-540 ft. developed a flow of 333.5 bbl. of oil in 2 hours. Pennsylvanian pay was from 8,421-8,510 ft.

Gulf Oil Corp. 1-AT State, 21-14s-32e, prepared to retest after recovering mud slightly gas cut from 9,563-9,640 ft., total depth.

A new pay, in the Devonian, has been added to the south side of the Teague field. Amon Carter 1-M Hill, 34-23s-37e, flowed 52 and 72 bbl. of oil on two 1-hour tests while on drill-stem test at 7,217-7,321 ft. Location is a south offset to Carter 2 Hill, which recently extended the field south with production from the Ellenburger.

The Texas Co. 2-AS State, east offset to the discovery of Tulk-Wolfcamp field, in 5-15s-32e, completed for 317 bbl. of oil a day through 18/64-in. choke on perforations at 9,705-9,779 ft.

In Eddy County, Richardson & Bass have scheduled a second deep wildcat as the 1 J. F. Harrison-Federal, 12-25s-30e, which is 25 miles south of their 1 Cobb-Federal, now drilling on a 14,500-ft. contract. The new operation was projected to 14,000 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Eddy County: O. H. Randal 1 Ivan Thurman, 9-26s-24e, dry, TD 595 ft.

Roosevelt County: Baker & Taylor Drilling Co. 1 State, 36-2s-30e, dry, TD 3,335 ft., elev. 4,429 ft., San Andres 2,850 ft.

DRILL PIPE FOR RENT

ALSO
- DRILL COLLARS
- KELLYS
- KELLY DRIVE BUSHINGS
- CORE BARRELS
- SAFETY JOINTS
- ROTARY SLIPS
- BLOWOUT PREVENTERS
- ROTARY TONGS
- ELEVATORS
- ROTARY SUBS

No need to tie-up operating capital in drilling equipment! Just call "Associated"! Drill pipe and tools are maintained in excellent condition, ready for immediate delivery on rental basis. All six yards (listed below) are equipped to give you fast 24-hour service!

(*Right*) All pipe returned to our yards is steam cleaned and rigidly inspected.

(*Left*) Returned pipe is straightened, repaired to first class condition and threads properly lubricated before being replaced on racks.

MAIN OFFICE — HOUSTON, TEXAS

HOUSTON, TEXAS
Phone CApitol 9596

CASPER, WYOMING

ODESSA, TEXAS
Phone 2331

NEW IBERIA, LA.
Phone 1553-J

HARVEY, LA.
Phone UPtown 8585

ASSOCIATED OIL FIELD RENTALS INC.

Louisiana-Ark.

Ouachita County Wildcat Twists Off Tubing

SHREVEPORT.—In Ouachita County, Harris H. Pace and J. W. Coan et al are coming out of the hole with fish after twisting off tubing at 1 Reynolds Gammill Lumber Co., C NW SE 28-15s-17w. The wildcat is bottomed at 4,015 ft. A show of oil was found in Meakin at 2,293 ft. and 10 ft. of oil sand in the Graves at 2,410 ft. Operator was preparing to test the Graves when the tubing twisted off.

Deep Rock Oil Corp. is drilling below 635 ft. in sand at 1 Sample, 4-10n-8w, White County. Sunray Oil Corp. is drilling below 5,366 ft. at 1 Ada Whetstone, 22-18s-22w. Broday Drilling Co. is drilling below 1,575 ft. at 1 Edward and Foster, C NE NE SW 15-13s-26w, Hempstead County.

Bergstrom-Butler Associates are cleaning out hole to drill ahead at 1 Ford and Faye Sadler, 5-5n-17w, Conway County, after setting 7-in. casing to 3,405 ft.

Shell Oil Co. is drilling below 10,755 ft. at 1 Browning-Burns unit, 12-20s-23w, Columbia County Springhill field deep Smackover wildcat.

Louisiana.—A De Soto Parish wildcat logged showed in two zones. The wildcat, 3 miles northeast of Grand Cane, De Soto Parish, is the A. W. Phillips 1 S. C. Harris estate, C NW NW SE 11-13n-14w. Log was run to total depth of 2,900 ft. to indicate 8-10 ft. of sand with kick. Gas showing was indicated in cuttings. A sand from 3,060-80 ft. was also logged. Log will be run to total depth of 3,160 ft. Drill-stem test will then be run of respective zones.

ARKANSAS WILDCAT FAILURES

Hempstead County: Broday Drilling Co. 1 Edwards and Foster, C NE NE SW 15-13s-26w, dry, TD 3,180 ft.

W. H. Bryant 1 Jones, 467 ft., south and 330 ft. west NEc SW 16-13s-23w, dry, TD 2,156 ft.

LOUISIANA WILDCAT FAILURES

Catahoula Parish: Barnett Serio 1 E. Young.

3,300 ft. west and 660 ft. north SEc Sec. 8 in. Sec. 45-7n-6e, dry, TD 5,510 ft.

Jackson Parish: Brown Paper Mill Co. 3 Fee, 2,118 ft. north and 3,387 ft. west SEc 35-14n-1w, dry, TD 5,515 ft.

La Salle Parish: Hunt & Gulf 67 Louisiana Delta Hardwood Lumber Co., C SW SW 13-5n-4e, dry, TD 6,006 ft.

Mississippi

Rankin Prospect To Test Lower Cretaceous

JACKSON.—Lion Oil Co. 2 Denkmann, deep test location in Section 22-7n-43, Rankin County, Mississippi, has been plugged back to test shows in the Lower Cretaceous. 7-in. casing was perforated 11,593-99 ft. and 11,453-59 ft. and squeezed with a total of 750 sacks of cement in several stages. Casing was then perforated 11,547-52 ft. for test. This zone is in the Hosston approximately 185 ft. above top of Cotton Valley. On 2-hour drill-stem test using ⅜-in. bottom and ½-in. top chokes and 5,000 ft. of water cushion, recovery in addition to the water cushion was only 210 ft. of mud with slight gas odor. Bottom-hole pressure was 2,350 psi. flowing and 4,400 psi. shut in.

Gammill-Cashion 1 Winston, Section 45-8n-2w, Adams County, Mississippi, approximately 1¾ miles southwest of Pine Ridge field, appears to be a new Wilcox discovery, but completion test has not been announced. Latest information available is that the well flowed at the rate of 150 bbl. of oil per day through 7/64-in. choke with tubing pressure 500 psi. Production is from perforations 5,808-09 ft. opposite Wilcox sand.

Humble Oil & Refining Co. 1 Williams et al, Section 10-3n-2e, Clarke County, Alabama, deep test at Carlton field, is reported coring below 14,371 ft. Recovery from core at 14,273-331 ft. was anhydrite, dolomite and shale with no shows of oil or gas.

MISSISSIPPI WILDCAT FAILURES

Adams County: R. L. Lawrence-L. Cashion Co. 1 Anderson Tully Co., 1-6n-1w, dry, TD 6,518 ft.

Carroll County: Roeser & Pendleton, Inc. 1 J. W. Bole, 21-19n-3e, dry, TD 4,020 ft.

Smith County: R. C. Hynson 1 Smith County Oil Co., 25-2n-6e, dry, TD 8,417 ft.

ALABAMA WILDCAT FAILURE

Escambia County: Humble Oil & Refining Co. 1 T. R. Miller Mill Co., 22-1n-9e, dry, TD 6,603 ft.

California

San Joaquin Holds Drilling Spotlight

LOS ANGELES.—Southern San Joaquin Valley continued to hold the drilling spotlight as Richfield Oil Corp. came up wtih a Pliocene sand discovery about 11 miles west of its recent Eocene and Miocene discoveries at Wheeler Ridge. The successful wildcat, 18-21 San Emidio in SW SW 21-11n-22w, was in process of being completed at last reports.

After hole was drilled to 8,006 ft. and bridged back to 7,280 ft., a 2-hour formation test was run at 7,253-80 ft. Clear 17°-gravity crude was produced at the rate of 500 bbl. daily along with a light, steady flow of gas. Hole was plugged back to 7,280 ft. where 7-in. casing was set.

Located 5 miles east of Midway-Sunset production, the new well is near the center of a 4,300-acre block held by Richfield. It was the company's third test of the block.

At Wheeler Ridge Richfield has set 9⅝-in. casing at 6,666 ft. to protect the Miocene sand discovered in the southwest offset to its Eocene discovery well. The stepout, 76-29 Kern County Land, will be carried deeper to test the Eocene but on a formation test at 6,300-6,500 ft. it flowed 44°-gravity crude at the daily rate of 1,100 bbl.

In the Tejon Hills area, D. K. Partnership No. 3 completed a high-gravity oil discovery almost ½ mile west of the established Willow Springs faultline production trend. The wildcat, 88-20 Corral in SE SE 20-11n-18w, on a formation test at 2,690-2,750 ft. flowed at the estimated daily rate of 1,000 bbl. of oil, mud, and water. The cut was about 70 per cent at the beginning of the 1-hour test but had decreased to about 15 per cent at the end. Lack of tankage prevented a thorough test of the discovery, which is believed to be in the lower Miocene.

Latest announced wildcat for southern San Joaquin was a 7,000-ft. test about 2 miles north of the Wheeler Ridge Eocene discovery. It will be drilled by Signal Oil & Gas Co. in 33-11n-20w and has been designated 1 Signal-Intex.

A new discovery recorded in Coastal California was Union Oil Co. 17 Simi in 3-3n-18w, Ventura County. A formation test at 2,852-2,926 ft. resulted in the recovery of 1,710 ft. of fluid, the top 90 ft. of which was gas-cut oily mud and the remainder clean

Directory of Oil Refineries and Field Processing Plants 1952-53 Edition

Complete listing of key men in all U. S. refineries and field processing plants. Published June 1952, 99 pages, convenient page size.

- Alphabetical listing of refineries of U. S. and Canada. Key operating, purchasing, technical personnel.
- Geographical survey of active U. S., Canadian, Mexican refineries with capacities and type product manufactured.
- State by state survey of Field Processing Plants with input and output capacities. Key operating, purchasing, technical personnel.

PRICES

Single copy ..... $10.00 each
7 or more copies ..... 7.00 each

Order from Publisher

THE OIL AND GAS JOURNAL
READER SERVICE DEPT.—BOX 1260
TULSA 1 OKLAHOMA

For Pumping Wells At Lower Cost —Install JENSENS!

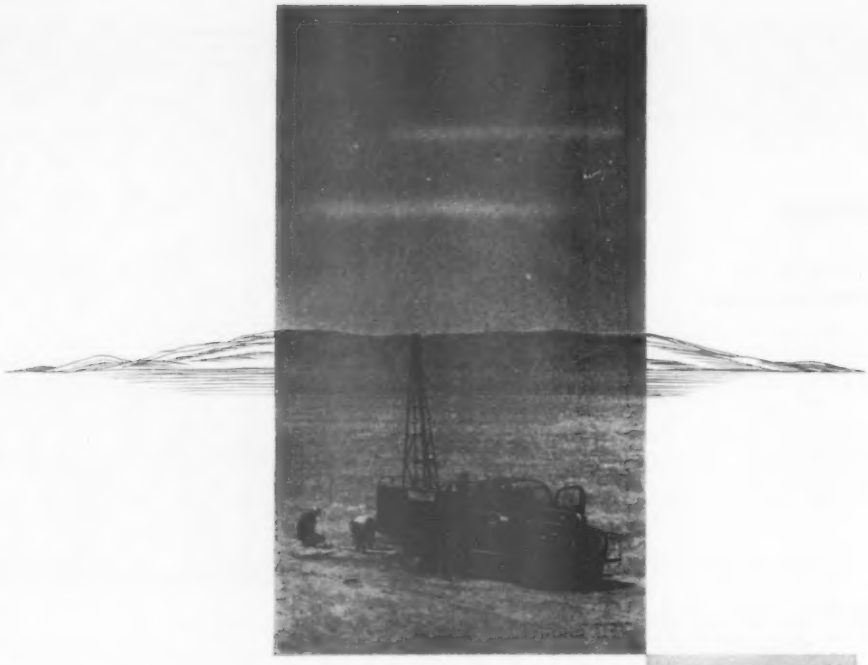
If you have a well that must go on the pump, or if you have a well or wells already pumping and would like to reduce pumping costs . . . do what major producers around the world have done for 33 years! Install JENSEN Pumping UNITS!

Performance records prove that almost any well is more profitable when pumped with a JENSEN UNIT . . . and this includes yours!

Convince yourself! Get the facts by writing us at Coffeyville, or see one of your nearby Jensen Dealers.

JENSEN

BROS. MFG. CO., INC., Coffeyville, Kansas
EXPORT OFFICE: 50 Church St., New York City



in the
Rocky Mountain Area...

ROBERT DYK
ROCKY MOUNTAIN
DIVISION MANAGER

GSI has named men of outstanding ability and experience to provide you with *personalized seismic services.* Robert Dyk is Division Manager of the Rocky Mountain Area. His proven ability is based on sound technical training plus sixteen years' experience in solving the geophysical problems that confront you. He and his staff can serve you well.

If your exploration program is in Colorado, Wyoming, Montana, North Dakota, South Dakota, Nebraska or eastern Utah let GSI's Rocky Mountain Division work closely with you.

Wherever you search for oil make use of GSI's complete research and development programs. These are coordinated to provide you with the highest quality information and interpretation.

GEOPHYSICAL SERVICE INC.
6000 LEMMON AVENUE • DALLAS, TEXAS

ROCKY MOUNTAIN DIVISION OFFICE: 227-229 McCLINTOCK BUILDING, DENVER, COLORADO

23°-gravity crude. Following the test drilling was resumed and resulted in the coring of additional Sespe sand.

The discovery is about 2½ miles southeast of Union's recent 9,000-ft. Sespe sand discovery at Torrey Canyon. It was completed for about 800 bbl. daily. While 17 Simi probably will be plugged back and the shallow pay produced, Union is expected to evaluate deep Sespe potentialities of the well. The company reportedly is planning to drill four shallow offsets to the discovery.

A Los Angeles basin development was the recompletion of 1 Kidson by Bolsa Chica Oil Corp. as a 200-bbl. flowing well. Located about ¾ mile east of Playa del Rey production, the wildcat was completed last December as a 100-bbl. producer in a Miocene schist conglomerate at 7,375-85 ft. Redrilling resulted in the discovery's performance being improved.

CALIFORNIA WILDCAT FAILURES

Los Angeles County, Newhall-Potrero area: Sunray Oil Corp. 103 R.S.F., 34-4n-17w, dry, TD 9,483 ft.

Monterey County, King City area: Murdock Oil Co. 1 Marian, 9-20s-8e, dry, Poncho Rico 1,867 ft., TD 3,929 ft.

Santa Barbara County, Lompoc area: Murphy Bros., Ltd. 2 well, 34-8s-34w, dry, TD 3,200 ft.

Ventura County, Santa Ana Ranch area: Superior Oil Co. 1 Chismahoo, NE NE 9-4n-24w, dry, TD 8,606 ft.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, ½-mile northwest extension to Tejon Hills field: D. K. Partnership-3 88-20 Corral, SE SE 20-11n-18w, flowed 300 bbl. of 35-40°-gravity crude from 2,690-2,750 ft., TD 3,397 ft.

Central Area

ILLINOIS

Discovery of another McClosky pool, located in southwestern Clay County, appears to have been made by E. A. Obering at his 1 Lowell Anderson Community. In a 2-hour drill-stem of saturation logged at 2,763-67 ft., the prospective well filled 270 ft. of oil and 300 ft. of oil-cut mud with a bottom-hole pressure of 500 psi. Casing has been run to the top of the pay at 2,762 ft. for production tests.

Location of the discovery, spotted in the NW SE SE 8-3n-5e, is 6 miles northwest of Xenia and about 4 miles south of Oskaloosa. Nearest production is approximately 2 miles to the northeast in the Oskaloosa area.

Another wildcat, Calvert Drilling Co., Inc., 1 Howard, located in the SW NE NW 16-7s-6e, 1½ miles south of Walpole, in southern Hamilton County, and about ¾ mile north of the Long Branch pool, northern Saline County, also is showing for a discovery well in the Aux Vases zone, logged at 3,098-3,106 ft. A 60-minute drill-stem test at 3,093-3,105 ft. flowed gas in 30 minutes and recovered 739 ft. of clean oil, 73 ft. of heavily oil and gas-cut mud, and 58 ft. of mud. Shut-in bottom-hole pressure was 1,320 psi. Casing has been run to 3,096 ft. for completion.

INDIANA

Slagter Producing Co. is completing two new Cypress sand discovery wells, one in Gibson County and the other in Posey County. The Gibson County discovery is at 1 Leffler, SE NE SE 25-3s-10w, 4 miles northwest of Elberfeld and 16 miles north of Evansville (Vanderburgh County). It swabbed at the rate of 72 bbl. of oil natural, but since then has been shot with 30 quarts, and at latest report was being cleaned out for further testing. Pay is at 1,637-58 ft. in open hole below 1,634 ft. Location is 3 miles from nearest production.

In Posey County, this company's 1 Smith, NW NW SW 28-6s-14w, 5 miles northwest of Mount Vernon and ¾ mile from other production, swabbed at the rate of 60 bbl. of oil per day while cleaning out after a shot with pay at 2,475-84 ft. Pay is in open hole with bottom of the casing at 2,470 ft.

WESTERN KENTUCKY

The recently opened Greenbrier North pool in southern Henderson County is getting its second well to confirm the Benoist sand discovery made by Stanford Oil Co. at its 1 McMullin, in 17-O-24. The second well, 1 Sugg, drilled by Carter Oil Co. and located northwest of the discovery producer, swabbed and flowed at the rate of 480 bbl. of oil per day while testing the same pay zone at 2,292-2,307 ft. Pay in the discovery well is at 2,310-18 ft. with total depth at 2,633 ft. Total depth of the Carter well is 2,315 ft.

EASTERN KENTUCKY

In the Martin County sector of Big Sandy gas field, United Fuel Gas Co. have completed a good well at 6665 Homer Muncey et al. Maxon sand topped at 1,274 ft. yielded an open flow of 4,427,000 cu. ft. of gas daily with a rock pressure of 500 psi. Total depth was 1,276 ft.

An exceptional good Devonian shale gas well has also been completed by United Fuel Gas Co. at their 4512 K. B. Morris. Located in the Pike County area of Big Sandy gas field well, on open flow gaged 4,226,000

HOW OIL IS FOUND

By Walter A. Ver Wiebe

Professor of Petroleum Geology at the University of Wichita

Here is a newly published book suited to the needs of the oil operator, lease operator, drilling contractor, and tax consultant. Written in a simple, easy-to-read style, with a new approach to the subject.

The choicest material available on petroliferous areas is presented. Facts on new methods used to find additional oil pools. Descriptions of more than 50 individual pools and 30 OIL REGIONS from all parts of the world are presented.

Information on rock texture, porosity, permeability, processes of sedimentation is supplied to the reader. Compositions of oil, plants, cycles and their significance are dealt with as well as the most favorable conditions for oil.

Techniques used to find oil deposits are explained fully. Electric logs, micrologs, radioactivity logs, rotary drilling and cable-tool drilling as well as well cuttings and a host of other methods are gone into in detail.

CHAPTERS INCLUDE:

1. Seepages Point the Way
2. The Oil Rocks
3. Time and Place of Rock Formations
4. That Magic Word Structure
5. How Oil Is Formed
6. How Far Does Oil Travel?
7. Where Does Oil Accumulate?
8. Methods Used in Oil Findings

- Completely up to date
- 312 illustrations, graphs, maps, etc.
- Pages 8½ x 11
- 247 pages
- $8.50

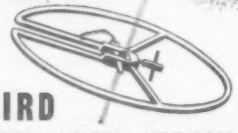
MAIL ORDER AND CHECK TO READER SERVICE

THE OIL AND GAS JOURNAL

BOX 1260 TULSA, OKLA.

PERRAULT
FIBER-CAST
THERMO-SET PLASTIC PIPE
REINFORCED WITH GLASS FIBERS
FOR
THE OIL INDUSTRY
THE GAS INDUSTRY
FRESH WATER SYSTEMS
SALT WATER SYSTEMS
"Everything for the Pipeliner"
★
PERRAULT Brothers
1130 NO. BOSTON,
TULSA, OKLA. • 5-1103
Export Office:
30 ROCKEFELLER PLAZA
NEW YORK, N.Y.
CIRCLE 6-6260

SANDED UP STRIPPING JOBS CAN BE MADE EASIER



BAIRD
SAFETY WHEEL WRENCH

Stripping sucker rods on a "sanded up" job with a Baird Safety Wheel Wrench saves time and perhaps an injury. Designed for safe operation, this wheel wrench cannot slip since the hub assembly is securely locked around the rod. Baird Safety Wheel Wrenches are available at your nearest supply store.

BAIRD MFG. CO.
P.O. BOX 380-TULSA

cu. ft. of gas daily. The test originally produced from the Maxon sand at 2,075 ft. but was drilled deeper to 3,347 ft. in the Devonian black shales topped at 3,285 ft. Rock pressure was 555 psi.

MICHIGAN

The trend in Michigan wildcatting, it appears, will be towards deeper drilling, to test at least the basal Salina and Niagaran. This going to be especially true on the rims of the Michigan basin, where drilling will be much shallower to this potential oil and gas reservoir than in the more central portions of the basin.

The most recent stimuli for this lower horizon wildcatting include Dow Chemical Co.'s chemical brine granite objective test well now being drilled in St. Peter sand below 5,830 ft. at the 32 fee, SE NE NE 27-19n-18w, Hamlin Township, Mason County, where an estimated 12-15 million cu. ft. gas pay was tested in the basal Salina at 4,212 ft. Panhandle Eastern Pipeline Co.'s recent completion of a Salina gas discovery in Casco Township, St. Clair County, at the 1 Ringel, C SE 31-4n-15e, and the small 15 bbl. oil producer at the HE-1 State-Chester, drilled by Brazos Oil & Gas Co. in the C NE NE 15-29n-2w, Chester Township, Otsego County. This well is being produced from a PBTD of 6,638 ft.

This week two new Salina-Niagaran wildcat tests were announced for the western-northwestern rim of the basin, while a new test to this same objective was announced for the southeastern rim. Turner Petroleum Corp. will drill a 4,000 ft. wildcat in the NE SE NW 22-13n-17w, Grant Township, Oceana County, while Carter Oil Co. announced a similar objective wildcat for Pleasanton Township, Manistee County, located in the NE NW SW 35-24n-15w. Panhandle Eastern Pipeline Co. was reported to have staked location for a new Macomb Township, Macomb County, Salina-Niagaran wildcat in the C NW 36-3n-13e.

ILLINOIS WILDCAT FAILURES

Bond County: Bill Montgomery 1 Arnold, NE SE NW 16-5n-14w, dry, TD 996 ft.
J. C. Nickerson 1 Utlaut, NE SW NW 33-4n-3w, dry, TD 1,066 ft.
Christian County: Joe W. Miloncus 1 M. & N. Ranch, NW SE SE 25-13n-2w, dry, TD 820 ft.
Clay County: C. E. Brehm 1 Sparlin, SE SE NE 33-3n-6e, dry, TD 3,125 ft.
Cumberland County: R. J. Steven 1 Cutright, SE NE SW 28-11n-10e, dry, TD 950 ft.
Edgar County: Pure Oil Co. 1 Rhoads, NE NW SW 33-13n-11w, dry, TD 1,339 ft.
Effingham County: T. S. Doran 1 Dodge, NE NE SW 12-6n-5e, dry, TD 2,455 ft.
Fayette County: R. W. Siemaker 1 Williams, NW NE SW 28-6n-3e, dry, TD 2,114 ft.
Hamilton County: C. E. Brehm 1 Hayden, SE SW NE 20-3s-7e, dry, TD 3,408 ft.
Madison County: Joe Simpkins 1 Schneider, E½ SW NE 31-5n-7w, dry, TD 1,582 ft.
Montgomery County: E. L. Wirth 1 Poggenpohl, SE SW NW 10-10n-4w, dry, TD 767 ft.
Washington County: A. M. Fowley 1 Sommers, SW SW NE 3-1s-4w, dry, TD 2,618 ft.
William R. Murphy 1 John Meyers estate, W½ SW SE 24-2s-5w, dry, TD 2,422 ft.
Wayne County: W. O. Lucas 1 Hufhines, NE NE NW 13-1n-5e, dry, TD 3,100 ft.

INDIANA SUCCESSFUL WILDCAT

Gibson County: Harold Sanders 2 Erdell, SE SE NE 25-2s-10w, IP 140 bbl., Aux Vases lime 1,838-43, TD 1,845 ft. (extension Barrett-Mitchell pool).

INDIANA WILDCAT FAILURES

Daviess County: F. L. Beard 1 Greenwood, SW NW SE 19-2n-7w, dry, TD 1,401 ft.
Graham Development Co. 1 R. C. Graham, NW NE SW 31-4n-7w, dry, TD 1,555 ft.
Gibson County: Boling-LeVine-Yabrove 1 Ashby, NW SE SW 5-2s-11w, dry, TD 2,403 ft.
Ashland Oil & Refining Co. 1 Seltzer, SW SW SW 30-3s-8w, dry, TD 1,848 ft.
Spencer County: I. L. Morris 1 Ahring, NW SW NE 31-4s-4w, dry, TD 969 ft.
Vanderburgh County: Calvert Drilling, Inc., 1 Kelsey, SE NE SW 29-5s-10w, dry, TD 1,115 ft.
C. E. O'Neal 1 Cox, NW NW SE 16-5s-11w, dry, TD 2,745 ft.
Vigo County: Thomas Little 1 Fee, SE SW SW 7-12n-8w, dry, TD 1,745 ft.

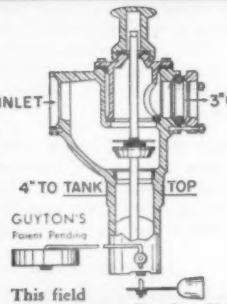
WESTERN KENTUCKY SUCESSFUL WILDCAT

Webster County: Hupp & Hume 1 Melton, 4,770 ft. from SL and 11,600 ft. from WL 23-N-23, IP 25 bbl., Paint Creek 2,318-28 ft., TD 2,655 ft. (discovery well Wanamaker East pool).

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: M. H. Johnson et al 3 Gilmore, 1,000 ft. from NL and 400 ft. from EL 9-O-32, dry, TD 1,086 ft.
Hancock County: Great Lakes Carbon Co. 1 Boyles, NW SE NE SW 3-P-33, dry, TD 975 ft.
Henderson County: K. R. Ingle 1 Boone, 1,050 ft. from NL and 750 ft. from WL 5-P-27, dry, TD 1,255 ft.
Iglehart Drilling Co. 1 Compton, WL NW SW NW 11-P-23, dry, TD 2,579 ft.

USED BY MANY
MAJOR OIL COMPANIES
STOCK TANK
ROUTING VALVE



This field proven poppet Routing Valve is now used as standard equipment by many major companies—Valve is set manually, and then switches flow from Tank to Tank, or by-passes a tank.) *Write for Complete information.*

MURDOCK
TANK & MFG. CO.
TULSA, OKLAHOMA

Buchman & Moran 1 Crafton, NE NW NE NE 1-O-25, dry, TD 2,496 ft.

Hopkins County: Basin Drilling Co. et al 1 Slaton, NE NW NW 8-K-26, dry, TD 2,732 ft.

McLean County: Waller Chenault 1 Belknap Miner, NEc NE SE SE 4-M-27, dry, TD 2,022 ft.

Ohio County: George & Wrather et al 1 Miller, 14,100 ft. from SL and 150 ft. from EL 11-M-32, dry, TD 2,572 ft.

Union County: P. E. Seneff 1 Riddle, 7,600 ft. from SL and 7,500 ft. from WL 17-M-20, dry, TD 2,532 ft.

Webster County: John Tuttle et al 1 Fulcher, 9,500 ft. from SL and 8,500 ft. from EL 19-N-22, dry, TD 2,771 ft.

Stanford Oil Co. 1 Biggs, NE SE SE NW 7-M-23, dry, TD 2,466 ft.

George A. Hoffman et al 1 Ranes, NW NW NE SW 11-M-25, dry, TD 3,200 ft.

MICHIGAN SUCCESSFUL WILDCATS

Mecosta County, Green Township: McClure Oil Co., Basin Oil Co. & Swan-King Oil Co. 1 Larson, NW SW NE 13-16n-10w, Stray sand 1,244 ft., 3,500,000 cu. ft. gas, TD 2,944 ft., PBTD 1,520 ft.

St. Clair County, Casco Township: Panhandle Eastern Pipeline Co. 1 Ringel, C SE 31-4n-15e, 14,600,000 cu. ft. gas from Salina pay after 5,000 gal. acid to 120-shot perforations at 2,496-2,535 ft., TD 2,763 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Heath Township: Cook Drilling Co. 1 Compton, NE NW SW 36-3n-14w, Traverse 1,467 ft., dry, TD 1,535 ft.

Hopkins Township: Max Spidel 1 Steska, NW NW SE 36-3n-12w, Traverse 1,680 ft., dry, TD 1,688 ft.

Newaygo County, Brooks Township: John E. Melvin 2 Calvert, NW NE SW 3-12n-12w, Traverse 2,483 ft., dry, TD 2,485 ft.

Otsego County, Chester Township: Brazos Oil & Gas Co. HE-2 State-Chester, C NE SW 10-29n-2w, dry, in basal Salina-Niagaran, TD 6,870 ft.

Wayne County, Taylor Township: Sun Oil Co. 1 Sun-Inkster Junction, NW NW NW 7-3n-10e, dry, TD 1,295 ft. (To be used as an LPG storage reservoir after a cavern is washed out in the salt beds).

Appalachian-Ohio

Two Good Oil Wells Noted in West Virginia

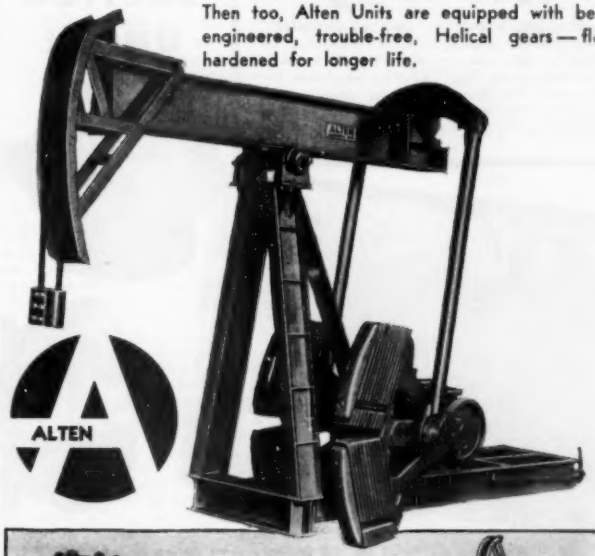
PITTSBURGH.—Harvey district, Mingo County, West Virginia, United Fuel Gas Co. 6905 Central Trust Co., resulted in approximately 60 bbl. of oil, completed at a depth of 1,250 ft. Ravenswood district, Jackson County, D. D. Foster completed 1 E. F. Suck in the Berea sand with 20 bbl. at a total depth of 2,149 ft. Triadelphia district, Logan County, United Producing Co. 113-1905 W. M. Ritter Lumber Co., gaged 1,107,000 cu. ft. of gas, Berea sand, total depth 3,678 ft. Williamsburg district, Greenbrier County, Deep Rock Oil Corp. 1 Bertha H. Thornbury et al, elevation 2,420 ft., is drilling at 6,792 ft. Jumping Branch district, Summers County, United Fuel Gas Co. 1-6788, elevation 2,613 ft., is at a depth of 4,850 ft.

Maryland.—Garrett County: Mid Atlantic Oil & Gas Co. 1 Oren T. Graser, resulted in a

ALTEN pre-testing means much to you

★ More fluid . . . uninterrupted operation . . . lower maintenance costs. You get them all with Alten Pumpers because each must prove itself in severe factory tests before shipment.

Then too, Alten Units are equipped with better engineered, trouble-free, Helical gears — flame hardened for longer life.



YOU GET THESE ADVANTAGES WITH ALTEN HELICAL GEARS:

EXTREMELY ACCURATE GEAR TEETH
Continuous direction of hob results in cutting accuracy beyond that obtainable from the shaper process which produces herringbone gears.

REDUCED SHOCK&LOAD
Impact or backlash loads are 10 to 20% lower than those on herringbone gears because Helix angles are 50% lower.

MAINTAIN PERFECT TOOTH PROFILE
Because Helical Gears have no unflexing centers, stress is evenly distributed over entire face of gear teeth. Tooth profiles are permanently retained.

FLAME HARDENED TEETH
Gears are precision cut from finest alloy steel and shaved for perfect profile then flame hardened for highest surface hardness obtainable.

—ALTEN—
Foundry & Machine Works, Inc.
LANCASTER, OHIO

TOOLPUSHER
"For fast pump hook-up, we haven't found anything that beats the WECO Fig. 400 suction union."
DRILLER
"Compounding the pumps is a quick, easy job since we've been using the WECO Fig. 400 for pump suction connection."
PURCHASING AGENT
"Those tough, durable WECO Fig. 400's give us a lot more service without trouble. And in my language, that's saving money."
DRILLING ENGINEER
"We've standardized on WECO Fig. 400 for pump suction connections, because we never have to match suction hose to pump."
WE GO FOR WECO FIG. 400 SUCTION UNION

When you use WECO Fig. 400 for your pump suction connection, the female blanking plug at right can replace the female sub on suction line and blank it for compounding the pumps.

The vibration and pulsation constantly present in a pump suction connection are a real test of sealing ability for any union. The WECO FIG. 400 is a master of this situation, plus the convenience of serving as a blanking plug when compounding pumps.

Rugged acme wing nut threads make-up quickly and a few hammer blows seal the union perfectly. For compounding, blanking plug replaces the female sub. The change-over takes but a few minutes.

The WECO FIG. 400 Suction Union not only provides a fast, simple pump suction connection, but also saves the cost and time of installing blinds or valves in the line for compounding.

Ask your WECO Representative about the Fig. 400 for your pump suction connections.

SOLD EXCLUSIVELY THROUGH SUPPLY STORES

It's Wise to Standardize with... WECO ...

WELL EQUIPMENT MFG. CORP.

A CHIKSAN Company

HOUSTON 1, TEXAS

CHIKSAN COMPANY

Manufacturers and Distributors of Oil-field, Refinery, Marine and Industrial Equipment

dry hole at a total depth of 3,511 ft. Cumberland & Allegheny Gas Co. 2 Jasper Riley is casing at 3,279 ft. The elevation of this well is 2,399 ft., Tully 2,635 ft., and the Onondaga at 3,263 ft. Heath 1 H. C. Gibson will be re-acidized. The depth of the hole is 4,035 ft. Blaho Oily & Gas Co., is fishing at 3,458 ft.

Pennsylvania.—Unity Township, Westmoreland County, southwest Pennsylvania: Peoples Natural Gas Co. 4003 A. J. Dotterway, is still fishing at a depth of 8,220 ft. The depth of the hole is 8,294 ft. No. 4008 J. R. Frola is drilling at 2,894 ft.

OHIO

John Morrow et al set casing and shot their 1 Walter Heffelfinger, Lot 12, New Castle Township, Coshocton County, with a first day delivery of 70 bbl. Scattered tests in this area would indicate a fairly good pool will be developed. Further south in the township, the Preston Oil 3 Charles Heffelfinger, 3rd Quarter, logged the Clinton at 3,359-3,434 ft. with 5 bbl. natural and 110 bbl. in 24 hours after shot. New Castle pool is being extended to the north by this, and wells on adjoining tracts.

B. H. Putnam et al are drilling their 1 C. D. Curtis, Section 29, Belpre Township, Washington County, on down to the Clinton sand. Their R. D. Reed, Lot 4, Watertown Township, found the Medina at 5,748-61 ft. dry, and have shut down at 5,800 ft.

OHIO WILDCAT FAILURE

Washington County, Adams Township: James I. Shearer et al 1 Clyde Shantz, Lot 18, Oriskany 4,114-30 ft., TD 4,130 ft.

Oklahoma

Canadian County Wildcat Indicates Bromide Field

SINCLAIR OIL & GAS CO. has indications of gas, and possibly oil production in the Bromide section in its 1 Community Hutchitman wildcat, located in the NW NE SE 14-12n-7w, 2 miles east of El Reno, Canadian County, on the northeastern rim of the Anadarko basin.

Best indications so far have been in a zone at 10,307-29 ft. in second Wilcox sand, from which, in a drill-stem test last 30 minutes, the well flowed at an estimated rate of more than 12,000,000 cu. ft. of gas per day through ½-in. and ¾-in. chokes, and yielded more than 30 ft. of oil-cut mud in the breakdown. The entire water cushion was unloaded during the first 7 minutes of the test and gas flowed in 8 minutes.

Hole since then has been deepened to 10,379 ft. in the same zone, where another test, taking in the interval below 10,337 ft., got a gas flow estimated at more than 2,890,000 cu. ft. per day. The latter test was cut short in 23 minutes when the packer failed to hold.

Previously, showings of somewhat lesser consequence had been obtained in Cherokee sand at 8,686-8,700 ft. and Chimney Hill lime at 9,690-9,735 ft. First Wilcox was called at 10,170 ft. but was tight.

Location of the prospective discovery is about 15 miles west of the southern end of the West Edmond field, on the Canadian-Oklahoma line, nearest production.

Another Misener sand producing area is being opened in southeastern Payne County where a wildcat, H. Waggoner & Co. 1 Caton, NW SE SE 27-18n-5e, flowed 50 bbl. of 45°-

gravity oil with 3,500,000 cu. ft. of gas per day through ¼-in. choke in production tests of pay in open hole at 3,756-74 ft. Location is about a mile north of Cushing.

Helmerich & Payne, Inc., 1 Seltzer, a wildcat located in the NW NE NE 15-28n-3e, 4 miles northeast of Newkirk, in northern Kay County, flowed 10 bbl. of distillate and 10 bbl. of water in 5 hours with gas at an estimated rate of 10,000,000 cu. ft. per day while testing Burbank sand in open hole at 3,087-3,101 ft. Location is a mile northwest of the North Mervine pool.

Four miles southwest of Perry, in Noble County, H.E.R. Drilling Co. has a new Perry sand discovery well at its 1 Strom, NW NW SE 8-20n-1w. With pay at 3,500-11 ft., open hole, the well is estimated good for 50 bbl. of oil with 1,000,000 cu. ft. of gas per day.

OKLAHOMA SUCCESSFUL WILDCATS

Lincoln County: George Puckett 1 Westfall, SW SW SE 31-17n-3e, flowed 102 bbl. of oil from Wilcox 4,876-84 ft., TD 4,884 ft. (extends SW Sporn pool).

Seminole County: Keener Oil Co. 2 Swan, SE NE NW 33-6n-6e, pumped 27 bbl. of oil from lower Calvin 1,630-39 ft., TD 1,644 ft. (extends Traugh pool).

OKLAHOMA WILDCAT FAILURES

Cotton County: Jack N. Huff and P. M. Harbour 1 Abbott, NE NE SW 11-5s-12w, dry, TD 1,834 ft.

Grant County: Midwest Oil Corp. and Ashland 1-A Staggers, NW SW NW 4-25n-3w, dry, TD 5,405 ft.

Lincoln County: Earl Ingram, Jr. 1 Harber, SW SE SE 23-12n-4e, dry, TD 4,415 ft. McElreath & Harvey 1 Brittain-Wilson, SW NW NW 20-12n-5e, dry, TD 5,517 ft.

Logan County: Herndon Drilling Co. 1 Collins, SE SE SW 2-15n-1e, dry, TD 5,378 ft.

Woods Oil & Gas Co. 1 Brace, SE SE NE 10-19n-2w, dry, TD 5,431 ft.

Noble County: H. E. R. Drilling Co. 1 Haggard, NE NE NE 17-20n-1w, dry, TD 3,884 ft.

Oklahoma County: R. M. Jordan 1 Haney, SE SE SW 24-14n-1w, dry, TD 5,805 ft.

LEGAL

4,573.08 ACRES of Tribal and 6,961.52 ACRES of Allotted Indian lands located in Townships 1 North, 1 and 2 South, Ranges 1 East, 1 and 2 West, USBM, on the Uintah and Ouray Reservation, Utah, are being advertised for oil and gas lease, bids on which will be opened July 30, 1952, at 2:00 P.M., at the office of Harry W. Gilmore, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

Osage County: F. H. Lindsay 1 Osage, NE NE SE 27-28n-9e, dry, TD 2,125 ft.

Payne County: Anderson-Prichard and N. V. Duncan 1 Freeman, SW SW NE 2-17n-2e, dry, TD 4,405 ft.

Texas County: Skelly 1 Allen, NE NE SW 30-5n-19ecm, dry, TD 6,694 ft.

Rocky Mountain

Another Williston Basin Discovery Indicated

DENVER.—The first tests following acidization of shows in Shell Oil Co. 1 Little Beaver, C NE SW 13-4n-61e in Fallon County, Montana, have apparently established a new Williston basin wildcat success in Montana.

With perforations in Ordovician from 8,474-8,525 ft. the wildcat swabbed 97 bbl. of oil, 75 bbl. of acid and displacement water during the first 29½ hours of a 34½-hour test. During the final 5 hours the recovery of 85 bbl. of fluid, of which 81 bbl. was 30°-gravity oil.

Shell has perforated 8,313-23 and 8,337-55 ft. and is preparing to acidize and test these zones. Top of Ordovician Red River was logged in the wildcat at 8,300 ft. Small shows of oil were recovered on drill-stem tests from 8,380 to 8,553 ft. with the best of these 415 ft. of 15 per cent of oil-cut mud from the interval 8,462-8,524 ft., substantially the same as that perforated for the initial test.

The wildcat is at the extreme southern end of the Baker-Glendive anticline, about 50 miles southeast of Shell's discovery in the Pine Unit area of Wibaux County, where substantial shows were tested in Ordovician, with eventual completion in Devonian.

In the Cedar Creek area of Dawson County, The Texas Co. has set casing and is preparing to test in the 1 NP "G" (NCT 8), C NE NE 7-16n-54e, where tests during drilling indicated possibility of a new pay horizon for the area. The top of Madison was logged at 8,043 ft. and no shows were found in the formation. Casing was landed at 8,120 ft. and will be perforated opposite shows in the Charles where discovery of 765 ft. of clean oil was made on drill-stem test at 7,851-7,953 ft. with tool open 4 hours. Completion in the Charles, if effected, will mark the first production from this formation south of the Shell Oil discovery well in the Richey area to the north.

In North Dakota Amerada Petroleum Corp. extended the Beaver Lodge producing area by 3½ miles with the successful test of 1 North Dakota "C," C SW SE 13-158n-95w, northeast of previous production. The well is 9 miles northeast of the discovery well in the field. Production was tested from the zone 8,320-57 ft. at the rate of 33 bbl. per hour. At the opposite end of the producing trend which has been developed to date the 1 Leroy Nelson, C SE SE 2-155n-96w, flowed at the

LEGAL

92,707.08 acres of Tribal and 23,401.58 acres of Allotted Indian Lands located in Twp. 11 N., Rges. 21 & 22; Twp. 12 N., Rges. 21, 22 & 23; Twp. 13 N., Rges. 17, 18, 19, 20 & 21; Twp. 14 N., Rges. 11, 17, 18, 19 20, 21 & 22; Twp. 15 N., Rges. 17, 20, 21, 22, 23 & 24; Twp. 16 N., Rges. 16, 17, 18, 19, 20, 21, 24 & 25; Twp. 17 N., Rges. 17, 18, 19, 20, 21, 22, 23, 24 & 25, E., BHM, in the Cheyenne River Reservation, South Dakota, are being advertised for oil and gas leasing, bids on which will be opened July 29, 1952, at 2:00 P.M., C.S.T., at the office of the Superintendent of the Cheyenne River Indian Agency, Cheyenne Agency, South Dakota. Full descriptions and copies of the advertisement may be obtained from the Superintendent, Cheyenne River Indian Agency, Cheyenne Agency, South Dakota, or from the Oil and Gas Supervisor, U. S. Geological Survey, Federal Building, Casper, Wyoming.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 80 acres of land in T. 18 S., R. 20 E., St. Helena Meridian, Louisiana, included in the Breton National Wildlife Refuge, within the known geologic structure of the Breton Island field, will be offered in one parcel for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, July 30, 1952, when bids will be opened. Details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

SIGNS!

Hi-gloss, long-lasting baked-on enamel steel signs at reasonable prices for every oil country use. Write for quotations.

U. S. ENAMELING CO.

P. O. Box 4116 Tulsa, Okla.

SHIP BY BARGE... FOR LOW-COST TRANSPORTATION*

TO AND FROM GULF AND INLAND PORTS

COYLE

GENERAL OFFICES:
P. O. BOX 6056 - STATION A
NEW ORLEANS 14, LA.

COYLE LINES
INCORPORATED

BRANCH OFFICE:
CITY NATIONAL BANK BLDG.
HOUSTON 2, TEXAS

COYLE

*WRITE FOR RATES

SERVING PORTS ON GULF INTRACOASTAL WATERWAY—
TEXAS, LOUISIANA, MISSISSIPPI, ALABAMA, FLORIDA •
CONNECTING WITH ALL RIVER CARRIERS AT NEW ORLEANS, MOBILE

MEMBER, AMERICAN WATERWAYS OPERATORS, INC.

ADVANTAGES Of An INFERNO "Double Cylinder Type" Firing Control

The Inferno "Double Cylinder Type" Firing Control turns the fire on ahead of the draft and cuts the draft off ahead of the fire. No danger of blowing out your fire. The speed with which the fire is turned on and off is controlled by one Double Choke Check Valve and the speed with which the draft is turned on and off is controlled by another Double Choke Check Valve. Write for Bulletin 8-B. Sold direct or through your favorite supply store.

The INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

Williston Basin
Abstract Township
MAPS
McKENZIE COUNTY
NORTH DAKOTA
Now Available!

Oil Companies interested in the Williston Basin will want these complete, accurate new maps that include land ownerships, lease ownerships and important mineral ownerships together with other valuable information on dry holes, producing wells and current drilling operations. Consists of 92 maps printed on durable 24" x 24" paper. Scale 3" to the mile. Price $10 per map. Send for complete information.

GREAT NORTHERN
Map Company
619 South Detroit • Tulsa, Okla.

rate of 133 bbl. in 3 hours for a west extension of 1 mile. This well is 2 miles northwest of the discovery well. The total span of production in the Beaver Lodge field is now 10 miles.

Amerada also completed three North Dakota wells, two of them for gages in excess of 500 bbl. per day. The 1 Skaar, C NE SW 13-158n-95w, 5 miles north extension to the Tioga area discovery was completed for a 525-bbl. per day gage. The 1 A. L. Ives, C NE SW 1-157n-95w, gaged 333 bbl. per day. In the Beaver Lodge pool Amerada completed the 1 I. M. Ramberg for an initial potential of 550 bbl. of 42°-gravity oil per day. All three gages were on ¼-in. choke.

Continental Oil Co. has completed its 10 unit, NW NW SE 1-42e-80w, in the West Sussex area of Johnson County, Wyoming, for a potential of 300 bbl. daily with production from Shannon sand at 2,885-2,990 ft. Oil is 36° gravity, with casing pressure 200 psi., tubing pressure 100 psi. on completion tests. The well is across faulting from West Sussex field proper, and is the eighth pool discovery in the general Sussex-Meadow Creek area. It was plugged back from 6,100 ft. total depth after finding lower formations nonproductive.

Shell is completing unitization of a block in the Shell Creek area of Sweetwater County, Wyoming, and will begin a test of the southern portion of the Washakie basin upon completion of the unit. The area is northeast of Hiawatha gas field, and the region has had little drilling. Gas possibilities of the Tertiary and Upper Cretaceous zones will be Shell's objective.

Ohio Oil Co.'s offset to its Preble area discovery in Cheyenne County, Nebraska, tapped a possible new pay horizon with test of oil from three Dakota zones. The well, 1 Rauner, NW NW SW 30-15n-48w, east of the recent discovery, had apparently commercial recoveries from first, second, and third (D, G, and J) sands. The discovery tapped only two of these. Top of first Dakota was at 4,395 ft.

In the South Red Wash area of Uintah County, Utah, Shell had recovery of 380 ft. of oil and gas-cut mud on 1-hour test of the interval 3,830-75 ft. Flowing pressure was 100 psi., shut-in pressure 1,660 psi. The wildcat found Green River at 2,600 ft. and is apparently showing higher than the basal Green River zones which produce in the Red Wash field proper.

WYOMING WILDCAT FAILURES

Converse County, Orim: The California Co. 1 Nylen-Gillespie, NE NE NW 20-31n-69w, dry, TD 1,387 ft. Cambrian 1,377 ft.

Natrona County: Olds Oil Co. 1 Burnside, NE NE NE 25-34n-80w, dry, TD 3,868 ft. Lakota 3,828 ft.

COLORADO WILDCAT FAILURES

Logan County: Plains Exploration Co. 1 Morris, SE SE NE 24-8n-54w, dry, TD 5,205 ft.

Prowers County: Charles A. Wallace 1 Witte, SE SE SW 12-24s-44w, dry, TD 5,990 ft.

Washington County: Skiles Oil Corp. 1 Brower, SW SE NE 34-1n-49w, dry, TD 6,872 ft. pre-Cambrian 6,855 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Cheyenne County: C. D. Edmonson 1 Needham, NE NE NE 28-13n-48w, dry, TD 4,476 ft. Fuson 4,420 ft.

Red Willow County: Superior Oil Co. 72-36 State, SW NE NE 36-2n-29w, dry, TD 3,955 ft. pre-Cambrian 3,877 ft.

NORTHERN NEW MEXICO WILDCAT FAILURE

McKinley County, Seven Lakes: Locke-Taylor 1 Balanced Rock, SE NE NW 9-18n-10w, dry, TD 3,100 ft.

Kansas

Another Oil Discovery Indicated In St. John Area

ANOTHER promising oil discovery has been made in the general St. John area of central Stafford County. It is located about 7 miles north of the town, in the SE NE SE 29-22-13, where Petroleum, Inc., found good saturation in the Lansing-Kansas City lime section at its 1 Walls.

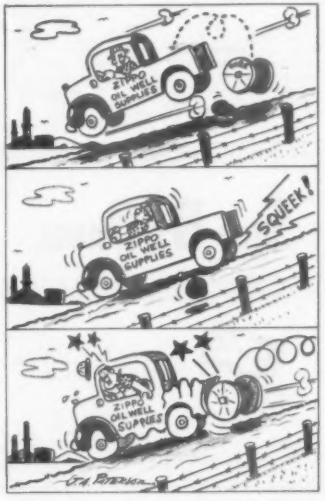
Top of the Lansing was logged at 3,459 ft. Best showings were in a zone at 3,572-86 ft., from which, in drill-stem test, open 60 minutes, 2,130 ft. of clean oil and 180 ft. of frothy oil was recovered with a bottom-hole pressure of 1,400 psi.

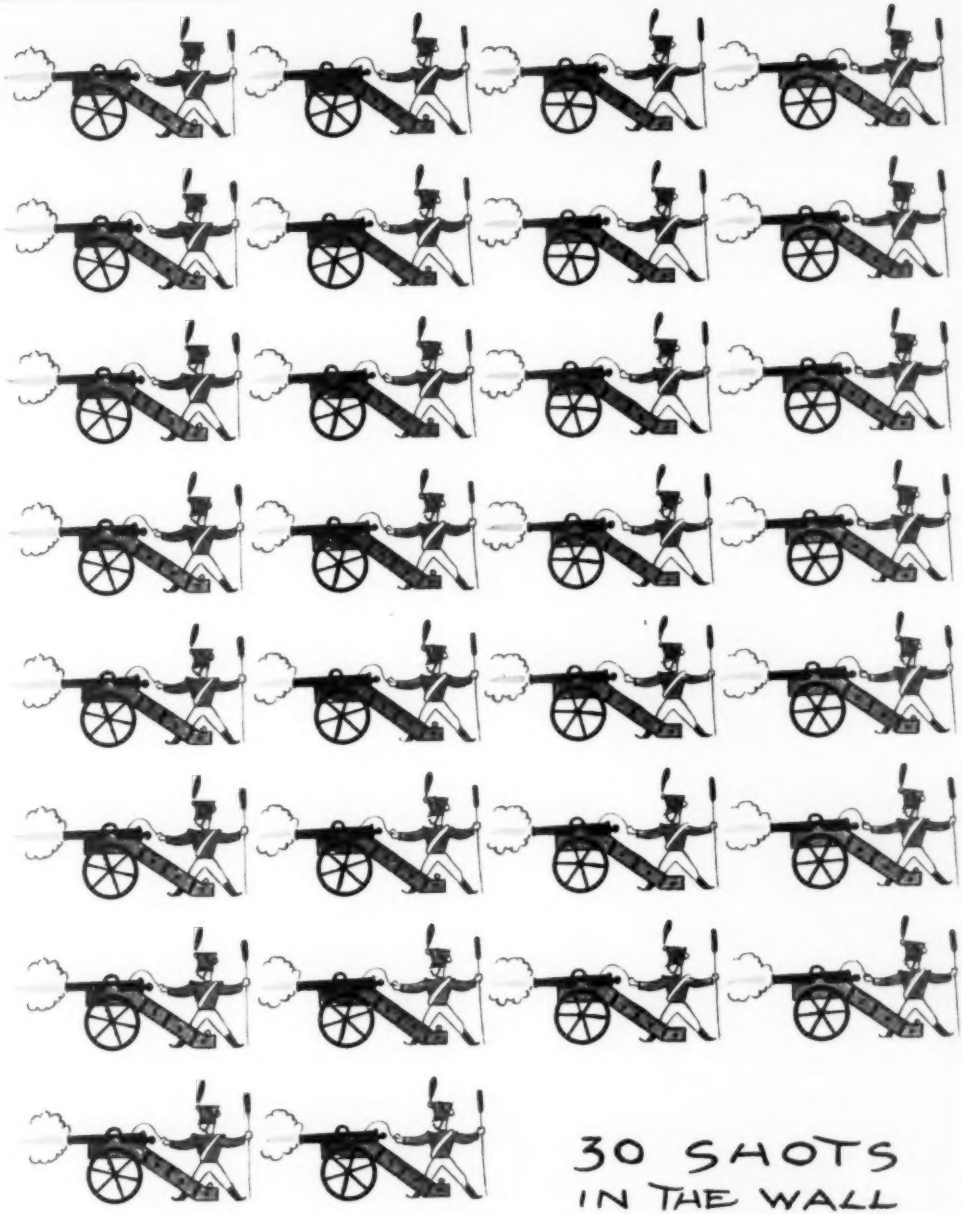
A previous drill-stem test at 3,468-3,522 ft. got 600 ft. of gas and 120 ft. of slightly oil and gas-cut mud with bottom-hole pressure of 200 psi.

Hole is being deepened for a look at the Arbuckle. Location is 2 miles southwest of the Kenilworth pool and about 3 miles southeast of the Oscar pool.

About 6 miles to the northeast and about 7 miles north of St. John, Jackson Drilling Co. is continuing tests at its indicated discovery well, 1 Crissman, NE NE SW 16-23-14. From casing perforations at 3,728-51 ft. in the Lansing-Kansas City section, the well flowed at an estimated rate of 3,000,000 cu. ft. of gas per day with 1½ bbl. of oil per hour. Since then, hole has been plugged back to 3,720 ft. and casing perforated in a higher zone at 3,664-72 ft., where the well swabbed 7 bbl. of oil and 1 bbl. of water in the first 3 hours. This well had been drilled to 4,083 ft. in the Arbuckle, topped at 4,083 ft., but failed to show for commercial production in that horizon. It is more than 3 miles from nearest production.

Champlin Refining Co. is testing a prospective discovery well in the southwest corner of Rooks County, where its 1 Fehnel, NW NE SW 16-10-19 got good oil showings in a series of drill-stem tests through the Lansing-Kansas City section, topped at 3,406 ft. Best interval tested was at 3,483-95 ft., from which 1,195 ft. of clean oil was recovered in 30 minutes. Bottom of the hole





30 SHOTS
IN THE WALL
OF THE WELL
AT THE WILL
OF THE OPERATOR

SAMPLE TAKER
..... ONE OF THE 25
SERVICES, DESIGNED
BY MEN WITH YEARS OF EXPERIENCE!
WHY OPERATORS PREFER SCHLUMBERGER!

Iospia

We need 3000 Carloads of Scrap a Day

Every pound of dormant scrap you can furnish will help to keep the steel mills and foundries producing

Steel mill furnaces are gobbling up scrap faster than it's being delivered. To maintain planned schedules of steel production for both military and civilian purposes, the mills must have *more* iron and steel scrap.

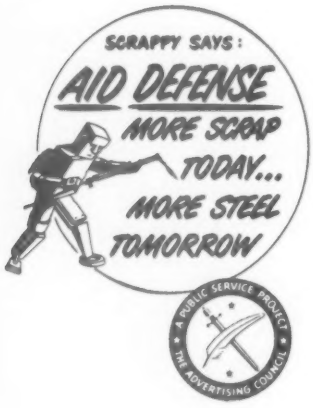
Get in the Scrap—Yourself!

Whatever your business, you undoubtedly have scrap. If there's dust on it or rust on it—it may be scrap. If it's scrap—it's *needed*.

Turn it over to your local scrap dealer and help lick this critical scrap shortage.

What you can do to help

1. Appoint one top official in your plant to take full responsibility for surveying the plant and getting out the scrap.
2. Consult with your local Scrap Mobilization Committee about its program to help out in the scrap crisis. The nearest office of the National Production Authority, Department of Commerce, can tell you who your local Scrap Mobilization chairman is.
3. Call in your local scrap dealer to help you work out a practical scrapping program. Non-ferrous scrap needed, too!
4. Write for free booklet, "Top Management: Your Program for Emergency Scrap Recovery", addressing Advertising Council, 25 W. 45th St., N. Y. 19.



FACTS YOU SHOULD KNOW ABOUT STEEL PRODUCTION

Steel production	1950	97,800,000 net tons
Estimated capacity	1952	119,500,000 net tons
Purchased scrap used*	1950	29,500,000 gross tons
Estimated purchased scrap requirement*	1952	36,200,000 gross tons

*All consumers

This advertisement is a contribution, in the national interest, by

THE OIL AND GAS JOURNAL
TULSA 1, OKLAHOMA

is in Arbuckle at 3,730 ft. with casing run to 3,729 ft., 1 ft. in the top.

The same company has another prospective oil-discovery well in the southeastern part of the same county at its 1 Brungardt, SE SE SE 35-10-17. A 30-minute drill-stem test at 3,194-3,205 ft. in the Lansing, topped at 3,106 ft., yielded 1,745 ft. of clean oil and had a bottom-hole pressure of 1,030 psi Hole is being deepened to the Arbuckle.

Promising oil and gas showings have been found in the St. Genevieve section in a rank wildcat in Finney County, in the Hugoton embayment. The wildcat, Cooperative Refinery Association and Holly Oil Co. 1-A Stewart, NE SW NW 6-23s-30w, recovered 38 ft. of oil-cut mud in a 45-minute drill-stem test in that section at 4,732-63 ft., and 90 ft. of gas, 60 ft. of heavily oil and gas-cut mud with some free oil in a 90-minute test at 4,809-38 ft. Location is 12 miles northeast of Garden City and the Hugoton gas field.

Rocket Drilling Co. 1 Hawkins, a Barton County wildcat, located 4 miles north of Great Bend and 2½ miles from nearest production, the Homestead pool, got 2,670 ft. of gas, 95 ft. of oil and gas-cut mud, and 240 ft. of muddy oil in a 60-minute drill-stem test at 3,277-3,331 ft. in the Lansing lime, topped at 3,158 ft. It has been drilled to 3,395 ft. in Arbuckle lime, topped at 3,393 ft. where casing has been run.

Cities Service Oil Co. 1 Westgate, NE SE NE 6-25-15, a wildcat in southwestern Stafford County, near the Edwards County line, had a calculated open flow capacity of 4,190,000 cu. ft. of gas per day in tests from a basal Pennsylvanian sand zone, opposite which casing is perforated at 4,166-84 ft. and 4,190-4,297 ft. Bottom of the hole is in Arbuckle lime, logged at 4,520-70 ft. Bottom of casing is 4,280 ft. This discovery is 2½ miles west of the Farmington field.

Western Ellis County has a prospective new Arbuckle pool where Imperial Drilling Co. is testing its 1 Giebler, SE SE SW 27-13-20. Hole filled 1,000 ft. with oil in 6 hours when plug was drilled out. Top of the Arbuckle is 3,814 ft. with hole open at 3,817-30 ft. Location is ¾ mile north of the Pleasant pool. The same company is drilling at another wildcat location a mile to the north at 1-A Herman, SW SW SE 22-13-20.

KANSAS SUCCESSFUL WILDCAT

Ellis County: Brunson 1 Irvin, SW SE NE 6-14s-19w, pumped 60 bbl. of oil from Simpson 3,877-83 ft., TD 3,883 ft. (new pay in Irvin pool).

KANSAS WILDCAT FAILURES

Barton County: Lindas 1 Rziha, NE NE SE 20-17s-12w, dry, TD 3,452 ft.

Butler County: Mallonee 1 Young, SE NE SE 3-28s-3e, dry, TD 3,116 ft.

Ford County: Siegel et al 1 Dinkela, NE NE NW 21-27s-23w, dry, TD 5,100 ft.

Graham County: Berwick 1 Sandbar, NE SE SW 13-8s-23w, dry, TD 3,836 ft.

Kingman County: K. Ellison 1 Wagner NE NE SW 10-28s-10w, dry, TD 4,564 ft.

Rooks County: Lindas 1 Roelfs, SE SW NE 35-7s-18w, dry, TD 3,399 ft.

Keating 1 Green, NW NW SE 23-8s-19w, dry, TD 3,460 ft.

Honaker 1 Darland, SE SE NE 11-10s-17w, dry, TD 3,503 ft.

Stafford County: Armer 1 McGill, SE NE SW 15-23s-12w, dry, TD 3,892 ft.

Sumner County: Buffalo 1 McGee, SW SW SW 8-33s-2e, dry, TD 3,843 ft.

Basin Oil Show Planned

ODESSA.—Plans for the 1952 edition of the Permian Basin Oil Show are forging rapidly ahead.

More than 200 firms exhibited in the last show and more are being expected this year. Plans are being made for an attendance of 100,000 visitors for the 1952 show.

The big West Texas oil event will be held during the 4 days October 16 to 19. Reservations for exhibit spaces for the show are now being received at show headquarters at 113 West Third Street in Odessa.

The show is nicknamed the oil-field workers' show, and is designed to give the field man a chance to see new tools and new services in operation. On the order of 300 exhibitors are being expected this year, including several large organizations representing manufacturers of all sizes of equipment.

Communities from all over the Permian basin have representatives on the show's board of directors. This arrangement has been made so that the show is representative of all of the vast oil-producing Permian basin rather than of just one or a few communities.

The show is being held during the Odessa and Ector County observance of Oil Progress Week.

COST CUTTING COMBINATION

Truco DIAMOND BITS

D&S CORE BARRELS

Drilling & Service

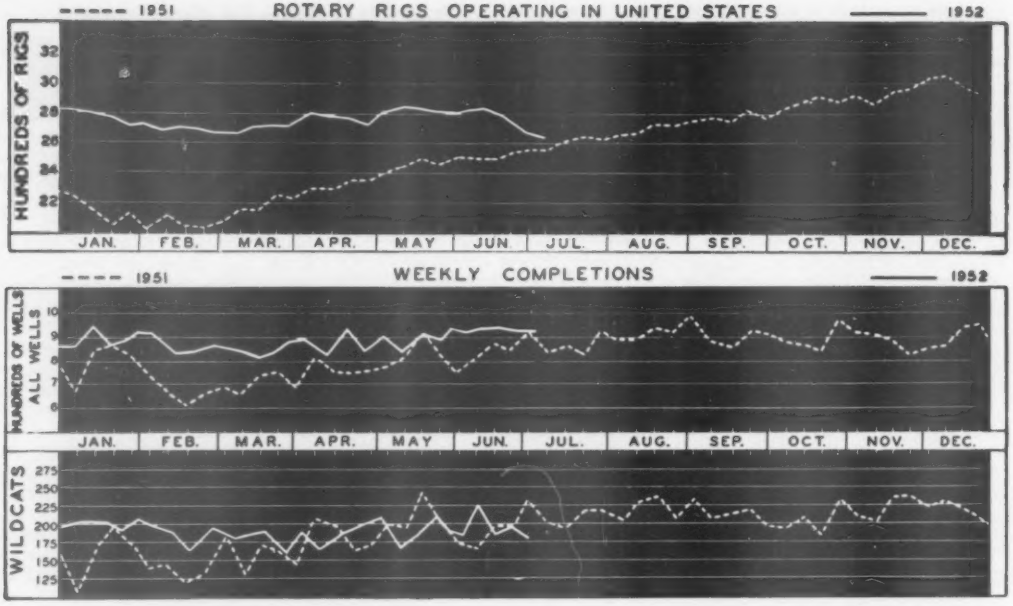
3031 Elm Street · Dallas 1, Texas

OFFICE PHONE: Riverside-6811
NIGHT NUMBERS: TRemont-5559, Victor-3708

Other Offices-Services	Tyler, Texas.....2-2742	Shreveport, La....5-5474
	Odessa, Texas....6-6774	Casper, Wyo.....3739
	Abilene, Texas....2-2790	Carmi, Ill.....7799
	Victoria, Texas.....3264	Ft. Morgan, Colo....1143
	Norman, Okla.....4360	Great Bend, Kans...7995
Distributors	Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949	
	Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861	
Foreign	D. T. O'Connor, 300 Fifth Avenue, New York, N. Y.	
	Petroleum Industry Consultants, C. A., Caracas, Venez.	
	Denton - Spencer Co., Ltd., Calgary, Alberta, Canada.	

THE OIL AND GAS JOURNAL

"Cornish, after this, when you have trouble back there—you let me come see you!"



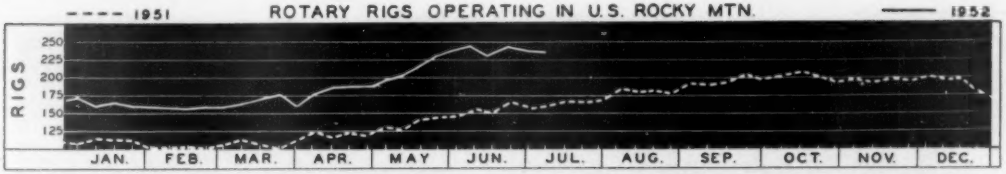
CURRENT STATISTICS

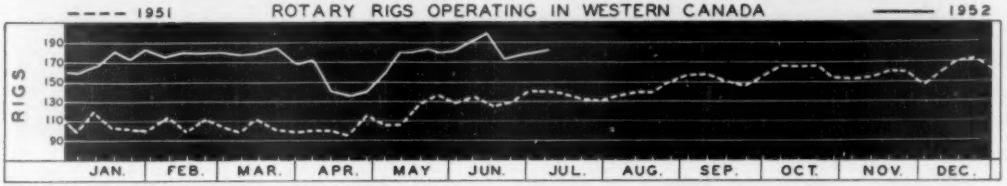
EXPLORATION

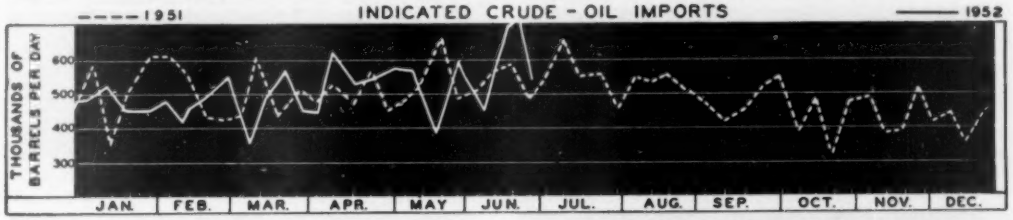
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 5, 1952

	Total of all wells					July 5		Wildcat completions and discoveries					Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	15	8	0	*7	20,000	366	309	0	0	0	0	0	0	0	0	0	0
Pennsylvania	42	21	4	†17	73,900	892	812	0	0	0	0	0	0	0	0	2	2
West Virginia	14	4	9	1	37,970	331	293	0	0	0	0	0	0	0	2	3	5
Ohio	15	8	1	‡6	38,205	496	445	0	0	0	1	1	0	0	7	8	15
Indiana	23	12	0	11	41,234	581	560	1	0	0	8	9	18	0	2	166	186
Kentucky	31	3	7	21	76,031	673	563	1	0	0	12	13	13	0	0	125	138
Illinois	65	29	1	35	149,175	868	1,131	0	0	0	14	14	8	0	0	243	251
Michigan	15	4	2	9	42,551	356	375	0	0	2	5	7	14	0	4	124	142
Kansas	92	48	4	§40	317,711	2,486	2,234	1	0	0	10	11	52	0	8	388	448
Nebraska	4	1	0	3	17,786	126	123	0	0	0	2	2	4	0	0	70	74
Oklahoma	97	56	8	§33	350,212	3,064	2,801	2	0	0	11	13	60	2	8	312	382
Texas	363	204	19	140	1,796,151	9,258	8,477	8	2	0	75	85	409	34	62	1,940	2,445
North Central (Dist. 7-B & 9)	113	51	2	60	378,854	2,883	2,582	3	0	0	37	40	228	1	22	814	1,065
West (Dist. 7-C & 8)	110	89	0	21	636,762	2,901	2,563	4	0	0	9	13	81	0	3	346	430
Panhandle (Dist. 10)	17	11	5	1	57,321	341	353	1	0	0	1	2	2	0	3	23	28
Eastern (Dist. 5 & 6)	18	10	0	8	107,067	480	630	0	0	0	5	5	15	3	1	106	125
Gulf Coast (Dist. 2 & 3)	70	28	9	33	471,901	1,377	1,181	0	1	0	12	13	47	20	14	279	360
Southwest (Dist. 1 & 4)	35	15	3	17	144,246	1,276	1,168	0	1	0	11	12	36	10	19	372	437
Louisiana	43	24	5	14	260,861	1,148	1,033	0	0	0	5	5	20	11	6	136	173
Northern	26	15	2	9	95,709	615	535	0	0	0	3	3	8	0	6	61	75
Southern	17	9	3	5	165,152	533	498	0	0	0	2	2	12	11	0	75	98
Arkansas	6	4	0	2	17,754	197	190	0	0	0	2	2	4	0	0	36	40
Mississippi	4	0	0	4	24,560	178	156	0	0	0	3	3	9	1	1	74	85
Southeastern States	2	1	0	1	12,649	32	31	0	0	0	1	1	1	0	1	19	21
Montana	6	4	0	2	26,517	130	95	0	0	0	0	0	2	0	1	25	28
Wyoming	11	6	0	5	47,931	351	355	0	0	0	2	2	15	0	3	51	69
Colorado-Utah	7	2	0	5	39,836	253	133	0	0	0	3	3	14	0	7	95	116
New Mexico	32	8	19	5	146,017	536	334	0	0	0	3	3	20	2	1	55	78
California	41	36	0	5	182,647	1,284	1,126	1	0	0	4	5	44	0	3	245	292
North Dakota	2	2	0	0	16,959	25	3	0	0	0	0	0	3	0	0	5	8
Miscellaneous	0	0	0	0	0	38	52	0	0	0	0	0	0	0	11	15	26
Total United States	930	485	79	366	3,736,657	23,669	21,631	14	2	2	161	179	710	50	127	4,137	5,024
Total previous week	931	503	71	357	3,854,916			30	0	11	156	197	696	48	125	3,976	4,845
Total July 7, 1951	837	432	64	341	3,262,112			24	0	7	169	200	733	40	139	3,800	4,712

Service wells included: *7, †15, ‡2, §1.



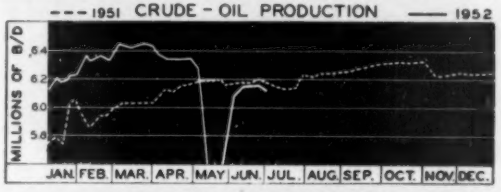


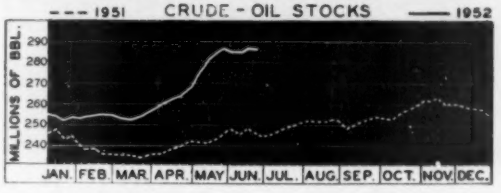


DAILY AVERAGE PRODUCTION FOR WEEK

	July 5, 1952			June 28
	Crude oil	Lease condensate	Total	total
Alabama	2,700		2,700	2,850
Arkansas	76,300	4,200	80,500	80,400
California	987,400		987,400	987,800
Colorado	83,500		83,500	81,500
Eastern	58,000		58,000	58,800
Florida	1,475		1,475	1,725
Illinois	166,200		166,200	170,500
Indiana	32,800		32,800	33,700
Kansas	331,400		331,400	307,500
Kentucky	33,200		33,200	34,100
Louisiana	633,025	34,800	667,825	664,600
North	110,800	13,300	124,100	123,650
South	522,225	21,500	543,725	540,950
Michigan	36,300		36,300	39,900
Mississippi	92,950	4,150	97,100	96,750
Montana	27,000		27,000	27,800
Nebraska	7,100		7,100	7,000
New Mexico	165,675	375	166,050	165,100
Oklahoma	510,300		510,300	508,600
Texas	2,582,950	42,700	2,625,650	2,699,500
Dist. 1	31,675	125	31,800	31,750
Dist. 2	137,675	3,900	141,575	147,575
Dist. 3	417,350	24,175	441,525	462,100
Dist. 4	226,550	4,900	231,450	241,300
Dist. 5	51,225	250	51,475	54,325
Dist. 6	112,075	3,750	115,825	119,775
E. Texas field	266,425		266,425	270,000
Dist. 7-B	91,050	50	91,100	92,525
Dist. 7-C	137,650	5,050	142,700	137,450
Dist. 8	867,750	200	867,950	897,050
Dist. 9	161,600	300	161,900	163,075
Dist. 10	81,925		81,925	82,575
Utah	4,350		4,350	4,400
Wyoming	187,500		187,500	189,000
North Dakota	3,000		3,000	2,800
Total U. S.	6,023,125	86,225	6,109,350	6,164,325
Change from previous week			down 54,975	
*Canada	168,680		168,680	192,200

Cumulative figures to be resumed when complete totals for strike period are available.



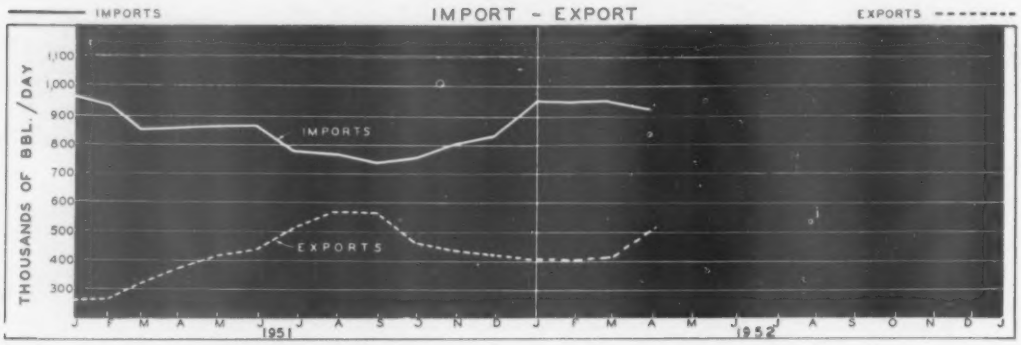


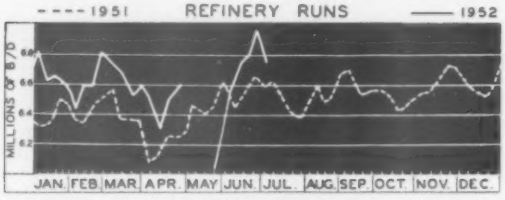
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

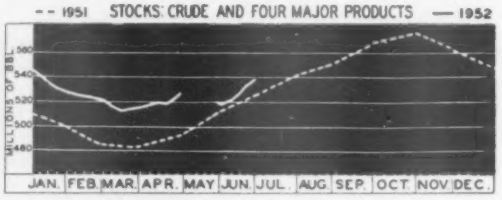
(Thousands of barrels)

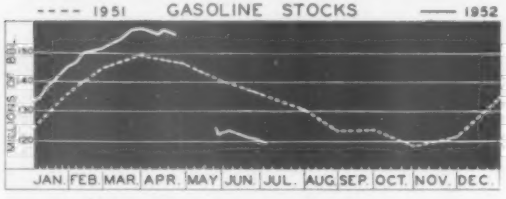
	June 28, '52	June 21, '52	June 30, '51
Pennsylvania Grade	2,343	2,527	2,090
Other Appalachian	2,017	2,086	1,471
Illinois, Indiana, Michigan	12,923	12,924	11,036
Arkansas	3,261	3,269	2,879
Louisiana	15,027	15,182	14,068
North	2,442	2,621	2,895
Gulf	12,585	12,561	11,173
Mississippi	3,377	3,427	3,076
New Mexico	7,818	7,618	6,742
Oklahoma and Kansas	43,635	43,691	36,913
Texas	142,264	142,653	116,912
East Texas proper	14,208	14,512	(†)
West Texas	62,415	60,860	(†)
Texas Gulf	30,442	31,953	(†)
Other Texas	35,199	35,328	(†)
Rocky Mountains	15,107	15,161	13,819
California	30,911	30,957	30,493
Foreign	7,917	8,150	7,800
Total	286,600	287,645	247,299

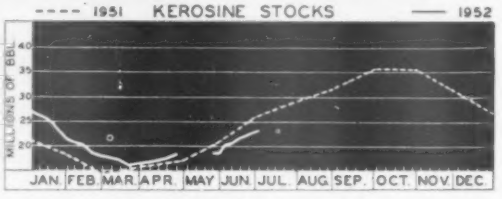
*Bureau of Mines. †Not comparable with current week.

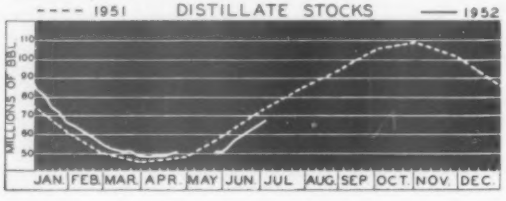


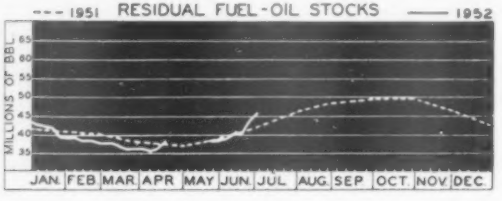










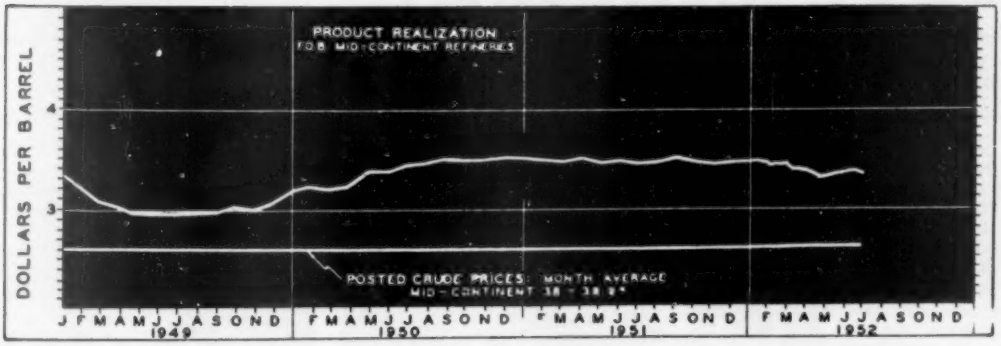


A.P.I. REFINERY REPORT, JULY 5

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, July 1951 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,078	410.0	41.6	262.2	231.0	28,393	10,107	21,409	12,201	988	399.3	41.1	218.9	225.2
Appalachian:														
District 1	103	45.7	5.0	8.6	9.6	3,642	494	976	746	103	43.7	5.4	14.6	9.5
District 2	82	40.7	2.9	15.6	11.0	1,731	255	374	307	78	39.2	5.4	7.6	17.0
Ind., Ill., Ky.	1,251	658.1	79.9	221.4	175.3	24,436	4,592	13,844	5,976	1,212	636.4	73.0	195.8	159.6
Okla., Kans., Mo.	530	312.9	10.3	124.6	56.0	11,147	1,452	8,939	1,573	478	258.2	16.1	105.7	58.9
Inland Texas	272	182.0	12.9	46.3	40.0	4,796	411	1,365	987	259	167.9	12.7	39.8	40.4
Texas Gulf Coast	1,630	732.2	114.8	363.6	260.0	17,048	2,952	7,385	7,264	1,556	724.3	106.7	338.2	274.3
La. Gulf Coast	523	236.7	64.0	130.2	52.8	5,983	1,839	2,516	1,997	504	246.7	49.1	119.1	64.3
N. La. and Ark.	80	31.6	8.1	20.7	5.0	2,629	495	1,132	214	85	32.8	8.0	15.3	7.9
Rocky Mountain:														
New Mexico	17	9.4		2.3	3.6	111		65	33	15	8.5	.3	3.0	3.8
Other Rocky Mtn.	228	113.4	3.4	47.1	42.8	4,433	379	1,677	1,320	229	107.3	4.3	43.2	44.2
California	959	449.7	5.7	133.0	352.0	15,184	336	7,860	13,554	955	427.1	7.6	126.8	369.6
July 5, 1952	6,753	3,222.4	348.6	1,375.6	1,239.1	119,533	23,312	67,542	46,172	6,462	3,091.4	329.7	1,228.0	1,274.7
June 28, 1952	6,949	3,253.1	344.1	1,438.0	1,283.9	120,902	22,338	64,143	44,972					
July 7, 1951	6,601	3,119.6	325.1	1,287.7	1,329.7	136,118	27,540	74,072	43,761					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.33 for week ended June 28, $3.34 for previous week, and $3.49 for June 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of July 9, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12.125-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅜-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	8¾-9	10.65	9
No. 2 straw fuel oil	7¾-8	9.65	8
No. 6 residual	$1.00-1.30	$2.35-2.50	$1.70-1.85

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	27-28
200 vis., No. 3 neutral, 0-10 pp.	14.5-15.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX
Mid-Continent

132-134 A.M.P.	5.5

GASOLINE continued strong on all markets in the country for the first week in July. Kerosine and distillate fuels can be classified as firm on Gulf Coast and East Coast markets but inactive in District 2. Residual fuel is soft for all areas east of California but is causing most trouble in Mid-Continent and North Central districts.

Gasoline stocks at the end of June were about 15,000,000 bbl. less than last year compared with a decrease of 17,500,000 bbl. at the end of May. Refinery operations in June improved the gasoline-stock picture about 2,500,000 bbl., but many operators feel that runs will have to be near capacity to meet gasoline demands in August and early September. Gasoline stocks are lower now than they were at the end of September last year.

Part of the strength of the gasoline market is due to the fact that some suppliers were able to borrow gasoline to meet part of demands during the refinery-strike period when total needs could not be covered by purchases. Some of these suppliers are now in the open market trying to buy gasoline to cover these loans.

The lack of activity in the distillate markets of the inland areas seems to indicate that some secondary suppliers and distributors are expecting the high runs, required to meet gasoline demands, to soften light-fuels markets before the end of summer. Most of Mid-Continent refiners on the Great Lakes pipe line are starting to build up distillate inventories in pipe-line storage since light fuels added during the summer months are not subject to demurrage until the middle of the heating season. However, there is not enough storage space at refineries and terminals to take care of inventory increases required to meet winter demands. Distillate will have to move to secondary and consumer storage before the middle of August. Total distillate stocks are down 5,800,000 bbl.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

EQUIPMENT MEN . . . in the News

Mission Official Elected To N.A.C.A. Presidency

Anan Golub, secretary and controller of Mission Manufacturing Co. has been named president of the Houston chapter, National Association of Cost Accountants, for the coming year. The Houston chapter is composed almost entirely of members from the oil and gas industries in the Gulf Coast area.

Yearly activities of the group include visits to various industrial plants in the Houston area. A recent visit was to Old Ocean field to get a first-hand look at production. The N.A.C.A. is devoted entirely to the study of the problems of industrial accounting.

Cameron Iron Works Moves New York Export Office

Export division offices of Cameron Iron Works have been moved to the Empire State Building, New York City.

D. C. Washburn, who has been a member of the Cameron export division for many years, has been promoted to the position of assistant sales manager, Export Division.

Koppers New West Coast Plant Now in Production

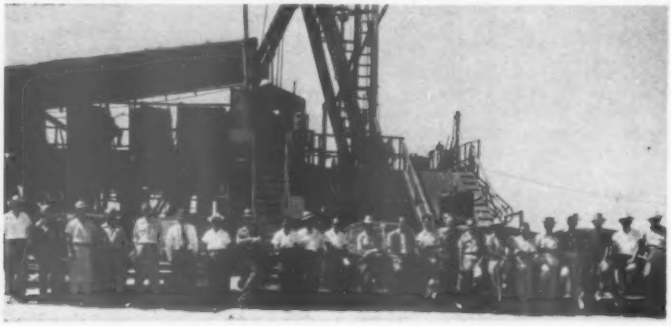
According to Fred C. Foy, vice president and general manager of Koppers Tar Products Division, Koppers Co., Inc., first production of tar-base enamel pipe-line coatings is now in process in a plant constructed at Fontana, Calif., adjacent to Kaiser Steel Co. property.

G. E. Traut, who has been superintendent of a group of four Koppers Tar Products plants in the vicinity of Everett, Mass., is in charge of operations at the new Fontana plant.

T. A. McGivern is in charge of the enamel and roofing plant, under Traut. He was formerly superintendent of Koppers Tar Plant at Hamilton, Ohio.

Products of the plant will be sold through the Los Angeles sales office of Koppers Tar Products Division which is headed by S. J. Katz, who is the division's Pacific district sales manager.

Weco Conducts Annual Sales Meeting in Odessa



An unusual feature of this year's general sales meeting of Well Equipment Manufacturing Corp., division of Chiksan Co., was holding the 2-day meeting in Odessa, Tex., more than 500 miles from the home office in Houston. The entire group attending the meeting are shown above on their visit to a rig in West Texas. They are: John W. Gates, sales manager, Weco, Houston; G. R. Winder, sales manager, Chiksan Co., Brea, Calif.; A. H. Watts, Weco representative, Graham, Tex.; Frank Wiegand, field engineer, Chiksan Co.; Walt Berntsen, sales representative, Chiksan Co.; Gus M. Bagnard, chief engineer, Chiksan Co.; J. C. McCelvey, Weco representative, Odessa; Bev Ragsdale, Chiksan, Salt Lake City; Bill Brien, Weco representative, Houston; Roy Shields, Weco representative, Baton Rouge; Eli Parker, Weco representative, Lafayette, La.; Bill Hull, Weco representative, Russell, Kans.; Jack Runnells, Chiksan Canadian representative, Edmonton, Alta., Canada; Durk Durkin, Weco representative, Hobbs, N. M.; Pete Bily, product development engineer, Chiksan; J. H. Robinson, general manager, Weco; I. D. Abshire, Weco representative, Corpus Christi; Charley Gisler, Weco representative, Tulsa; Harry Rogers, Weco representative, Longview, Tex.; Jimmy Llewellyn, Weco representative, Lubbock, Tex.; Chuck Holcomb, special representative, Weco, Houston, and Foster Jordan, assistant sales manager, and company tool pusher, Weco.

Standard Pipe Supply Co. Expands Houston Operations

GERALD RAUCH

Standard Pipe Supply Co., Houston, has purchased 40 acres of land on the Wallisville Road and the New North Loop Super Highway. Operations now conducted at its Lyons Avenue yard will be expanded at the new location. Standard Pipe has been distributors of steel and wrought iron pipe for over 25 years. Morris Rauch, founder of the company and present chairman of the board, and Gerald Rauch, president, are owners and principals of the company.

Since its inception the company has been active in the processing of pipe for oil companies. It is anticipated that Standard's new property will permit large-scale warehousing and greatly increased services for the processing and the distribution of pipe of all kinds.

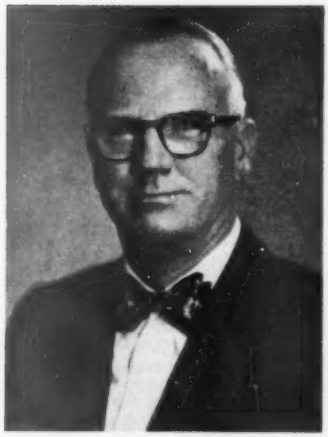
Lloyd Blankenship Joins Oakite Products, Inc.

Lloyd A. Blankenship, former manager and consulting engineer for Olathe Machine Co., Olathe, Kans., has been appointed to the petroleum service division of Oakite Products, Inc., New York. Previously he served as chief engineer and mechanical superintendent of the Sunray Oil Corp. refinery at Allen, Okla., and as district supervisor of station maintenance for the Great Lakes Pipe Line Co. over a four-state area.

Conkling Is Appointed Assistant Sales Manager

New Bedford Cordage Co., New Bedford, Mass., has announced the promotion of Hazid C. Conkling to the position of assistant sales manager. Conkling has been with the firm 8 years, during which time he covered the New Jersey and eastern Pennsylvania territories, as well as the ports of Norfolk and Baltimore.

Prior to joining New Bedford, Conkling was engaged in sales and service work for the Philgas division of Phillips Petroleum Co. He will make his headquarters in New Bedford, Mass.



JOHN MAHER

ARTHUR PENICK

Oil Center Tool Observes Its Twenty-Fifth Anniversary

Twenty-five years ago, Oil Center Tool began business in Houston in a small machine shop. Original equipment in the O-C-T shop consisted of a milling machine, drill press, shaper, and two engine lathes.

Today, the company's plant occupies more than 50,000 sq. ft. of floor space, with further expansion under way. O-C-T has facilities covering 13½ acres, and an international reputation for specially designed and produced oil-field equipment.

O-C-T arose because the Penick brothers, Arthur J. and Kirby T., saw the need back in 1927 for a small machine shop intended primarily for doing special work for Houston firms with heavy industrial equipment. Another Penick brother, Edward, who worked at a Houston bank, set up the bookkeeping system for the company. Also a force in the founding of the new enterprise was Paul Clark, who gave financial aid to the Penicks in launching their venture.

Present officers of the company are Arthur Penick, chairman of the board of directors; John Maher, president; Jim Witovec, vice president and production superintendent; Fritz Richard, vice president and plant manager; Rex Galloup, sales manager, and Tom S. Gillis, treasurer.

Richard was O-C-T's first employe, and it is significant that he has been a major factor in Oil Center, occupying the post of vice president since 1931.

By the end of 1928, Oil Center had begun the manufacture of high-pressure oil-field equipment. The first O-C-T products were pump liners and rods, distributed through Texas Rubber & Specialty Corp. From this it was a natural step to high-pressure fittings made under an agreement with Elko Oil Tool Co.

Two years later, in 1930, East Texas oil field came in. O-C-T made two notable contributions during the first year the East Texas wells flowed with tubing and casing heads. These products still account for a large volume of its annual sales.

In the early years of the East Texas boom O-C-T engineers decided that it would be feasible to assemble christmas trees in the Houston plant and ship them to East Texas ready for installation. Christmas trees could be pretested at the factory, thus preventing performance failures in the field.

Business resulting from East Texas created a large demand for O-C-T products, and the product line was expanded in the early 1930's. In the meantime, it was decided to open a field warehouse in Kilgore, Tex., to receive plant-assembled christmas trees.

Walter Burke, employed as salesman and manager of the Kilgore store, is still with the O-C-T sales department, working out of Houston.

In 1936 O-C-T came out with its present welding flange, which gave more strength than the screw type formerly in use. The resulting product was proved in the Rodessa, Louisiana, field, then producing the highest gas pressure with which the industry had yet been faced.

The company moved into its present location on Airline Drive in Houston in 1936. The new plant site was chosen to allow for future expansion.

By 1937, new high-pressure wells at Cotton Valley, La., and elsewhere made it necessary to design and produce the first 10,000-lb.-test christmas tree. This piece of equipment was successfully made and installed by O-C-T. Demand for it and similar specialties brought the company to a major decision: Oil Center Tool concentrated its entire facilities on the design and manufacture of christmas trees, blowout preventers, and well-head equipment and fittings.

Two record-making wells show the extent to which O-C-T's high-pressure equipment is used in the constantly widening search for new oil. Continental Oil Co.'s 1 Estes, bottomed at 11,476 ft., showed a tubing pressure of 8,920 lb. Bottom-hole pressure was 11,000 lb. The well-head assembly consisted of an O-C-T C-19 casing head, and T-16 OU tubing head with the new PC production choke.

An O-C-T well head assembly was also selected by Superior Oil for use on its West Poison Spider test in Wyoming, which went below 20,000 ft. to establish a new depth record that still stands

By 1946 Oil Center was ready to expand its markets over the United States and internationally. This new expansion was launched under John Maher, who became president in 1946 as Arthur Penick assumed the duties of chairman of the board.

O-C-T products are distributed exclu-

JIM WITOVEC

FRITZ RICHARD

REX GALLOUP

TOM S. GILLIS

sively through supply stores, and the firm lays claim to being the first manufacturer of well-head equipment to adopt this distribution policy. When supply stores moved into East Texas in the wake of the 1931 boom, O-C-T equipment was consigned to them. After the Corpus Christi boom subsided in 1938, Oil Center closed its company warehouses entirely, and turned over warehousing of products to supply stores. Since 1946, Maher has reestablished company-operated warehouses, and feeder outlets to supply stores in various areas.

When Maher took over the presidency in 1946, the firm had six salesmen in the field. Today, it has 24 men calling on rig operators.

Six warehouses now serve as supply depots at strategic locations: Odessa and Corpus Christi, Tex.; Lafayette, La.; Oklahoma City, and Hobbs, N. M.

Closely allied with O-C-T's vigorous sales program is continuing research and development, headed by Jack C. Webber. Webber has won recognition for technical papers on oil-well pack, gel cementing, and other subjects.

Hayes Joins National Aluminate Sales Staff

Edward R. Hayes, formerly with the research department of Standard Oil Co. (Indiana), has recently joined the sales staff of the Catalyst Division, National Aluminate Corp. He will serve as technical representative in connection with sales of Nalcat cracking catalyst to the petroleum-refining industry. Prior to joining Standard of Indiana, Hayes attended University of Maine and Cornell University where he studied chemical engineering. He was awarded an M. S. degree in chemical engineering from Cornell in 1948.

Schlumberger Changes Field Management

Schlumberger Well Surveying Corp. has announced several changes in field management personnel in carrying out the continued expansion of its operations. H. C. Brand has moved from his

H. C. BRAND

L. A. ALLAUD

post as assistant area manager at Tulsa to North Central Texas division manager at Dallas. M. L. Millican has been transferred from Kermit, Tex., to Midland, Tex., where he is district manager. J. W. Little replaced Millican at Kermit as district manager.

J. L. Heath leaves his position as district manager at Kenedy, Tex., to take the same position at Wichita Falls. J. B. Markolf fills the district manager position at Kenedy. Lee Petty has been made district manager at Columbus, Tex., replacing Markolf. J. C. West has been transferred from Tyler, Tex., where he has been field engineer, to the management of the district office at Magnolia, Ark. C. F. Schwab takes over the duties of resident engineer at the Mount Pleasant, Mich., station.

Moving to the headquarters staff at Houston are R. P. Alger and J. S. Kellough. Alger, formerly district manager of the company at Magnolia, Ark., joins the operations department in Houston as assistant to the chief field development engineer. Kellough leaves his position as district manager at Midland to enter the engineering department at Houston.

L. A. Allaud, recently returned from a 4-year period of service with Schlumberger Surenco, S. A., in Venezuela, has been made assistant area manager of the newly created Northwest Texas area under the direction of J. A. Bodin.

Western Co. Names Changes In Pumping Services Dept.

Several promotions affecting personnel of the pumping services department of The Western Co. have been announced by Walter Beadle, vice president in charge of field operations.

Promotions announced include: D. D. Walters, manager, North Permian basin

D. D. WALTERS

C. SIMMONS

district; Charles Simmons, assistant manager, North Permian basin district; Henry Landusky, manager, Snyder station; Jim Wilson, assistant manager, Hobbs station; J. D. Allen, assistant manager, Seagraves station, and Roy S. Priolo, assistant manager, Levelland station.

Walters has been with Western for 4 years and was formerly manager of the Eunice station. Prior to his new assignment, Walters was assistant manager of Western's South Permian basin district.

Simmons has been affiliated with Western for 3 years, and has been successively treating engineer and district engineer in Odessa, and manager of the Seagraves field station. Simmons will continue to office in Seagraves and will be concerned primarily with the supervision of the Seagraves and Levelland stations.

Longhorn Awards New Building Contract to Marshall

Contract was recently awarded by Claude R. Whelchel and G. W. Hunt of Longhorn Supply Co. to Marshall Construction Co. for the construction of an office and warehouse building at Houston. Building will consist of over 15,000 sq. ft. of area, with a two-story masonry-and-concrete office building at front, and a rigid steel frame warehouse building at the rear. Office will consist of space for sales personnel, recreation room, vault, and large sales lobby. The warehouse space will have fluorescent lighting, a jib crane, and a loading dock for four vehicles at side and unloading space at rear. Longhorn specializes in oil-field and industrial supplies. To facilitate the rapid handling of business, special telephone equipment and a two-way short-wave radio station are being included in building.

Denning Named to Totco Staff at Snyder, Tex.

H. H. (Pete) Peters, vice president of Technical Oil Tool Corp., reports the appointment of E. A. (Ed) Denning to the Totco staff at Snyder, Tex. Denning replaces A. D. Tucker, who has been transferred to Williston, N. D.

Denning, who will work under the direction of F. E. Siever, West Texas division manager, will headquarter in Snyder and service the Continental Supply Co. store area at Snyder and San Angelo, Tex.

Wolverine Organizes New Technical Sales Unit

A technical sales unit, designed to render technical service on problems particularly related to heat transfer

C. H. KUTHE

L. J. BONACOR

and product fabrication, has been announced by John M. Dumser, director of sales of the Wolverine Tube Division of Calumet & Hecla Consolidated Copper Co.

This new unit will be headed by C. H. Kuthe, manager of technical

R. B. DAVIS

H. C. FLESCH

sales. He will be assisted by L. J. Bonacor, R. B. Davis, and H. C. Flesch.

Prior to assuming his new duties, Kuthe was manager of Wolverine's product-development department. Bonacor and Davis were formerly in the company's sales estimating and engineering departments respectively. The technical sales unit will headquarter in the company's general sales offices at the Guardian Building in Detroit.

Great Northern Offers McKenzie County Maps

Officials of Great Northern Map Co. of Tulsa have announced the completion of a series of township maps covering McKenzie County, North Dakota.

These abstract maps give accurate information as to land ownership, lease ownership, and important mineral ownership, along with other valuable information, including dry holes, producing wells, and current drilling operations.

The McKenzie County series comprises a total of 92 separate maps 24 by 24 in. with sections on the scale of 3 in. to the mile.

Filtrol Entertains Foreign Agents at Export Meeting

Filtrol Corp., through its export manager, Troy Monk, and other members of the organization, welcomed representatives from more than 20 countries who were present at the second International Foreign Agents' meeting of Filtrol Corp., in Los Angeles.

Albert C. Dankelman of Socotecnic, Belgium; Carl C. Hunt of Otis, McAllister & Co., Colombia, Venezuela, and Central America; Robert G. Burke, Atkins, Kroll & Co., Philippine Islands; Fred S. Stevens, Dominion Oil Co., New Zealand; and Renato Ibarra, Ernesto Ibarra y Cia., S. A., Mexico, were present at the first foreign agents' meeting held in October 1949 in Los Angeles and were also present at this meeting along with Nicolas Bensmann of Dr. Hermann Bensmann, Germany; Rolando J. Longoni, Argentina; W. N. D. Stevens, Stemco, Ltd., Great Britain; Abel Lopes Martins, Abel Lopes Martins, Ltda., Portugal; F. Yamaguchi, Tokyo Boeki Kaisha, Ltd., Japan; C. G. Gips, W. R. Grace & Co., Chile and Peru; Axel Axelsen, Alf Axelsen, Norway; and Bondi M. Saporta, Egypt.

Los Angeles Nomads Plan Annual Golf-Dinner Party

Responsible for arrangements at Los Angeles Nomads' golf-dinner party are, back row: E. B. Doyle, Bill Sargent, Ray Humphreys, Jerry Engstrand, and Vern Mitchell. Front row: George Gutekunst, Joe Schlarb, Bill Bettis, and Leo Cypher. John Flanagan and Dick Winter were not present for the picture.

The Los Angeles Chapter of Nomads has completed plans for its annual golf-dinner party to be held July 11 at the Riviera Country Club. The event starts with a golf tournament during the day, followed by a dinner in the evening. After the dinner, the golf and door prizes will be awarded. Climax of the evening will be an elaborate floor show.

The committee in charge is headed by W. H. (Bill) Sargent, Sargent Engineering Corp. Individual activities are being handled by: H. J. (Joe) Schlarb, Chiksan Co.; George Gutekunst, Gardner-Denver Co.; W. F. (Bill) Bettis, Johnston Testers, Inc.; Jerry Engstrand, Grant Oil Tool Co.; I. B. (Babe) Doyle, Hydril Co.; Vernon Mitchell, Security Engineering Co.; John Flanagan, Johnston Testers, Inc.; Leo Cypher, Baash-Ross Tool Co.; Ray Humphreys, Axelson Manufacturing Co., and G. R. Winder, Chiksan.

Continental Announces Sales Organization Changes

The Continental Supply Co., Dallas, has announced the appointment of new managers at four points.

The Cody, Wyo., store is now under management of Frank E. Prosser, for-

merly field salesman at Liberal, Kans. Hollis C. Beeson has been named manager of the Shreveport store, having been serving as field salesman at the same location. Formerly floorman at Russell, Kans., Floyd R. Johnson has been made manager at that point.

New store manager of the Farmington, N. M., store is Bill Evans, who has been serving as field salesman at the same location. Also announced by Continental is appointment of J. R. Osteen as district refinery salesman at Shreveport. He has been manager of the store at that location.

Oil Metering, Processing Firm Organized in Houston

Oil Metering & Processing Equipment Corp., offering a complete line of well checkers and metering units for oil-producing companies, has been formed in Houston. Founders of the new firm are H. Vernon Smith, president and general manager, and George A. Repal, vice president and secretary.

VERNON SMITH

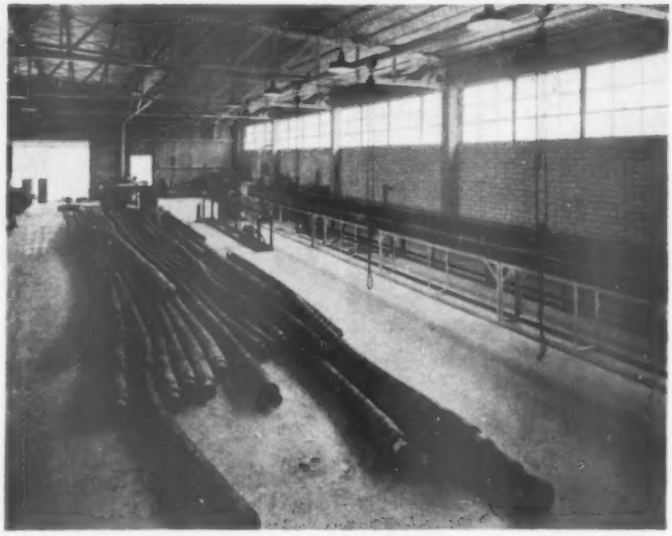
GEORGE REPAL

The new corporation, with headquarters in Houston, will operate under the trade mark, OMECO. The company's line of metering equipment will include well checkers; metering separators; and oil, gas, and water meters. Processing equipment will include emulsion treaters, water knockouts, water filters, and oil and gas separators.

Smith formerly worked as a petroleum engineer for W. C. McBride, Inc., for a year and a half, and was later with the hydraulic division of Twin Disc Clutch Co. in Rockford, Ill., as an experimental and development engineer for 3 years. He was a design engineer and later chief engineer for Parkersburg Rig & Reel Co. for 5 years. In 1949 he joined Rolo Manufacturing Co., Houston, as general manager. He resigned from Rolo to form OMECO.

Repal will be in charge of manufacturing for OMECO. He joined Wyatt Metal & Boiler Works in 1936, and since that time he has worked for Dow Chemical Co., Crown Central Petroleum Co. in Pasadena, Calif., and General Welding Works in Houston. He was with Rolo at the time he resigned to join Smith in forming OMECO.

Goodall Rubber Moves Into New Houston Offices



Rotary-hose repair shop contains a large section of the new Goodall Rubber Co. of Texas plant at Houston.

Goodall Rubber Co. of Texas has moved into new and larger offices in Houston. The new building contains 8,000 sq. ft. of space.

Goodall manufactures Long-Life flexible cord rotary hose and the Barney coupling. The new building includes a rotary-hose repair shop where damaged Goodall hose can be sent, and the Barney coupling reset.

H. (Barney) Barnard is president of Goodall Rubber Co. of Texas.

Herasimchuk Visits Camco Plant During U.S. Visit

John V. Herasimchuk, general manager of International Gas Lift, S.A., of Caracas, Venezuela, is in the United States on a 6-week visit.

His company represents Camco gas-lift equipment in South America and he spent several days visiting the Camco plant in Houston. He will go to Canada for the Devon oil show before returning to Venezuela.

Paris Named Distributor For Gorman-Rupp Co.

Gorman-Rupp Co., manufacturers of engine and motor-powered pumps, has announced the appointment of Henry H. Paris Distributor, Inc., Houston, as Mid-Continent and Gulf Coast oil-field representative for Gorman-Rupp pumps and parts.

Henry H. Paris and his associates have established a Gorman-Rupp oil-field warehouse service succeeding that of the late Tom L. Turner.

All orders, inquiries, and business routine relating to Gorman-Rupp product should be directed to Henry H. Paris Distributor, Inc.

A program of factory training in both sales and service is in progress for the entire Paris personnel.

Baldwin Resumes Duties At Petroleum Mechanical

FRANK BALDWIN

Frank Baldwin has been released from active duty as a captain in the Army Engineers in Korea to resume his duties as vice president of Petroleum Mechanical Development Co., according to an announcement by Marvin Jones. Baldwin's release from active duty is in line with the Army's policy of returning men to civilian life to help relieve the current acute shortage of experienced engineers in the oil industry.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 15c a word one issue. 10% Discount three or more consecutive issues. $3.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

PIPE
All sizes; line pipe and casing, tanks, and Oilfield supplies. Edco Pipe & Supply Co. Phone 45970, P.O. Box 151, Tulsa, Oklahoma

FOR SALE at Sasakwa, Oklahoma, 3350', 12¾" OD, 2325' 12" plain end, used, ¼" wall line pipe, 2.00 per foot, 2500' 13" OD 50# Lapweld casing. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: Good 3½" and 4½" OD Drill pipe. Two EKU Waukesha's, One RL Cardwell, Hercules Engine, Tanks, Treaters, Pumping units. Rogers Pipe & Supply Co., 620 Wright Bldg., Tulsa, Oklahoma.

FOR SALE near Russell, Kansas, approximately 80,000' 2" water line buried and must be removed between harvest and planting time. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

1—36L Bucyrus-Erie Spudder, powered by GK 145 Waukesha Motor, complete with 7" and 5" tools, steel dog house, Kohler light plant skid mounted. NOTE: This machine is in excellent condition. Priced $20,000.00 complete. P.O. Box 87 or telephone 1084 or 1519, Salem, Illinois.

CARDWELLS FOR SALE
FOR SALE: 2—Model "RL" Cardwell spudding units. Serial Nos. 560 and 578, powered by 145 GK Waukesha engines, complete with all tools for 7" and 5½" hole and necessary equipment for 24-hour service. 1—Model "RL" Cardwell beam unit, Serial No. 598, powered by Model 6DCB44 Buda engine, Serial No. 301808, with diesel fuel system, complete with all tools for 7" and 5½" hole and necessary equipment for 24-hour service. Call telephone 5732 or write P. O. Box 183, Great Bend, Kansas.

WE sell used/rebuilt Well Drilling Equipment, Bulldozers, Draglines, electric generating plants, air compressors, trenchers, railroad equipment, surplus machinery, etc. Mr. Gonzalez, Baker Export Co., Pecos, Texas.

JACKS—JACKS—JACKS—I still have a limited amount of Jenson Jacks New and Used, Also some Seven inch O.D. Casing. A. R. Daniel, Garnett, Kansas.

FOR SALE: Model "L" Series, Cummins Engine, Serial No. 58344, completely reconditioned. Taylor Machinery Co., P.O. Box 2846, DeSoto Station, Memphis 2, Tennessee, Phone No. 37-4356.

STEEL STORAGE TANKS
11—55,000 bbl. Tanks—114' 6" dia. x 30' high
10—80,000 bbl. Tanks—117' 6" dia. x 41' high
All tanks steel roof, riveted construction throughout. Standing location near Mexia, Texas, and suitable for re-erection. Detailed specs. and prices available on request.

SOUTHERN IRON & METAL CO.
Box 3270, Beaumont, Texas
MID-STATES PIPE & SUPPLY CO.
Box 2534, Tulsa, Okla.
ROGERS & WRIGHT, INC.
215 Wright Bldg., Tulsa, Okla.
HORWITZ PIPE & STEEL CO.
Box 1406, Oklahoma City, Okla.

EQUIPMENT FOR SALE

STEEL TANKS: 2—4,000 bbl. Columbian bolted tanks, 36' diameter by 20', knocked down our yard, as is, where is or erected your location. We also have available, subject to prior sale, a number of 55,000 and 80,000 bbl. riveted tanks which we can refabricate and erect as welded tanks with either cone roof or our floating roof. Tancred Steel Construction Company, Ph. FEderal 6576, P.O. Box 5885, Dallas 2, Texas.

FOR SALE: One 36-L Bucyrus-Erie drilling machine, complete with tools. Also 1,942 ft., new 7 inch, 17 lb., H-40, range 2, seamless casing and 2,409 ft. of new 2⅜ inch, 4.60 lb., range 2, J-55, seamless regular tubing. Box E-812, The Oil and Gas Journal, Tulsa, Oklahoma.

for
VALVES • FLANGES • FITTINGS
it's
Newman's Inc.
"One of the Southwest's Leading Distributors"
Tulsa, Okla. P.O. Box 1865 Ph. 25228-LD 635

FILTERS for Oil Clarification
22—Sperry 18" x 18" Filter Presses, plate and frame, closed delivery, 11 chambers, ½".
1—Tolhurst 48" center slung Chip Wringer, 7½ hp. Motor.
CONSOLIDATED PRODUCTS CO., INC.
17-29 Park Row New York 38, N. Y.
BArclay 7-0800

EQUIPMENT FOR SALE

10,000' 4½" API Full Hole Drill Pipe tested by Sonoscope engineers, also 1075' 6⅝" OD 36# Drill Pipe, like new. Milford Giffin, Tel. 477, Hoisington, Kansas.

FOR SALE at our Oklahoma City warehouse, Attention: Mr. T. P. Mace 50,000' 3" 7.67#—40,000' 4" 10.79#—6,000' 6" 12.89#—8,000' 6" 18.97#. All used plain end, cleaned and beveled. 24,000' 3½" OD 4.95# plain beveled new seamless line pipe. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: Two truck-mounted Bettis steam generators; one 30 hp. on a '48 Ford C.O.E.; one 40 hp. on a '41 Chevrolet 4 by 4. Both units completely equipped. Also selling yard and building at Russell, Kansas. Going out of business. Dave Edmiston, Russell, Kans.

5-IN. STD. PIPE

25,000 ft.—5" (5.563" O.D.) 14.8# Wrought Iron Line Pipe, 20' SRL, plain end, used, good condition. Suitable oil, water and gas, or could be threaded and coupled for water or oil well casing. Location: Washington, Pa., vicinity. Price available on request.

Mid-States Pipe & Supply Co.
Ph. 2-9128 Tulsa, Okla.

PIPE FOR SALE

40,000'—3½" O.D. Standard 7.6# used line pipe—T & C.
20,000'—3½" O.D. Standard 7.6# used line pipe—P.E. Torch Cut.

Above pipe has all been machine cleaned, straigtened and is in sound condition. Available for immediate shipment.

THE INTERSTATE PIPE & SUPPLY CO.
Marietta, Ohio
P. O. Box 548 Phone 2468

LIQUIDATING

FORMER TEXAS COMPANY REFINERY
DALLAS, TEXAS

PRESSURE VESSELS • AIR RECEIVERS • TANKS • KELLOGG FURNACES
PIPE • VALVES & FITTINGS • STEAM PUMPS • CENTRIFUGAL PUMPS
HOT OIL PUMPS • ELECTRIC MOTORS • HEAT EXCHANGERS • STACKS
AGITATORS • INSTRUMENTS • AIR COMPRESSORS

WIRE—WRITE—PHONE
For Complete Catalog

All items priced attractively for quick sale as must vacate premises.

DALLAS REFINERY PROJECT
Box 5624 Phone Federal 6566 Dallas, Texas

EQUIPMENT FOR SALE

TWO truck mounted water well rigs with Ford motors pulling rigs capable of drilling 1100 feet small hole. 4 x 6 mud pumps; one with 2⅜ rods; other with 2½ upset tubing with tool joints on every joint. Both in operation when owner injured. $6500 or can be bought separate. Ben Wilson or Victoria Pipe & Supply, Victoria, Texas.

FOR SALE 2660 feet 7" OD Used casing 10-V thread A-1 condition. Bier & Vanderpool, Box 693, Plainview, Texas.

WELL drilling equipment, new or used. Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE: At our Gladewater, Texas, warehouse, attention J. W. Fagan, 2 used 2½"-5"x10" Wheatley Power Pumps, direct connected to Buda Gas-Gasoline engines on steel base, $450. Cities Service Pipe Line Company, Patridge, Bartlesville, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-8427—Houston, Texas

NEW PIPE
Available Immediate Delivery

5700 ft.—8⅝" O.D. 28.55# Byers Wrought Iron Pipe, 20' SRL, ends beveled, test pressure 1200# PSI. Location: Topeka, Kansas.

25,000 ft.—4" O.D. (10 ga.) 5.8# Electric Resistance Weld, 40' DRL, ends beveled, tested 1200#. Location: Oklahoma City.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 Tulsa, Okla.

At Special Low Prices

500,000' each 2"—2½" — & — 5½" O.D. Used, Seamless, Plain End, Machine Cleaned.

Pressure Tubes for Line Pipe

Carload Quantities

New, Prime, Corrosion Resistant "YOLOY" Pipe—¾" to 3", T&C & P.E. Immediate Delivery from Stock

Columbus Steel Supply Co.

UNiversity 1175 Columbus (3), Ohio

FOR SALE—GAS ENGINES AND GAS COMPRESSOR CYLINDERS

1—200 H.P. Clark Twin Gas Engine, 16" x 20" Power Cylinder
1—165 H.P. Bessemer Twin Gas Engine, 17" x 20" Power Cylinder
2—80 H.P. Clark Single Gas Engines, 16" x 20" Power Cylinders
1—26" x 20" Compressor Cylinder
1—24" x 20" Compressor Cylinder
2—18" x 20" Compressor Cylinder
1—16" x 20" Compressor Cylinder
1—6¼" x 20" Compressor Cylinder

All above units are complete and in good operation condition and located in Benton, Illinois.

BROWN-STRAUSS CORPORATION
1546 Guinotte Kansas City, Mo.
Norman Strauss Phone HArrison 1000

Salesman on premises. Contact R. V. Crisp, Phone 1419 or 610, Benton, Illinois.

EQUIPMENT FOR SALE

FOR SALE: National 50 Draw works with 2 Buda 1879 Gas or Butane Motors, Twin Disc clutches, 7½"x15" C-250 Ideal Pump, 127' Lee C. Moore Cantilever Mast, Lee C. Moore Pipe Racks, Lee C. Moore 6x18x36 Substructure, 13⅝" Shaeffer Model 34 Blowout Preventer, Link Belt Model 145 Shale Shaker, 8x20 and 8x16 steel doghouses, 5000' 4½" A.P.I. full hole drill pipe, three 6¼" Reed Drill Collars, 2 light plants, 3200 gal. Butane Tank, two 4½" drill collars for drillin purposes and all necessary drilling in tools, 4½" to 10¾" slips and elevators, and all necessary hand tools. Rig now running 3 miles SW Caldwell, Kansas. Phone 4-0750 or 4-0721, 300 Brown Building, Wichita, Kansas.

FOR SALE: 48-L Bucyrus-Erie, Trailer Mounted, Waukesha WAK Motor. 36-L Bucyrus-Erie, Trailer Mounted, Waukesha GK-140 Motor. RL Double Drum Cardwell, Skid Mounted, Waukesha GK-145 Motor. Dog Houses, Light Plants and Tremendous stock of Drilling and Fishing Tools. All equipment in first-class condition and ready to work. Will sell tools or any item separately. Special price to one purchaser for all equipment. This is worth investigating. Box 337, Farmington, New Mexico, Phone 429-W.

NOW working in South Texas area. Cardwell "Mobilehoist" double-drum workover rig, powered with Waukesha gas-gasoline 6MZ engine. 5000' rig complete with 5000' 9/16" swab line, 1" drill line Brewster 50 ton three sheave block and hook, 7" x 5½" double telescoping 55' pole. Complete with O.C.T. packoff for 2" and 2½" tubing, substructure, hand tools, etc. Less mud pump. Price $8500.00. Box E-829, The Oil and Gas Journal, Tulsa, Oklahoma.

ROTARY Drilling Rig complete. Steel Mast. Roller bearing throughout. 2000 ft. capacity. Two men operate. Well built. Shallow drilling, reverse circulation, clean out. Box 106, Seminole, Oklahoma.

1—10" x 11 x 5 Ingersoll-Rand Type XOB air Compressor with 145 Waukesha Engine, extra cylinders and other equipment. 1—12" x 11 x 5 Type NCTB Two Stage Chicago-Pneumatic Compressor complete with 6 WAK Waukesha Engine. Above located in Las Animas Field 17 miles SW of Hebbronville, Texas. Inquire Industrial Engine Service, P.O. Box 469, Hebbronville, Texas.

FOR SALE: 87' Lee C. Moore cantilever drilling mast complete with 5'x33' substructure. Call 2-2055 Oklahoma City, or write 1514 Liberty Bank Building.

1 SUPERIOR 90 hp. twin gas compressor and 1 Superior 90 hp. twin gas engine. Alfred B. Kern, 223 Wright Building, Tulsa, Oklahoma.

Storage Tanks—FOR SALE: Eight—55,000 bbl., steel tanks with steel roofs. Located Henrietta, Texas, on railroad siding. James W. Heath, Henrietta, Texas.

FOR SALE: D-12,000 Caterpillar Diesel, skid type, 85% good as new condition, $3,000. Too large for our Spudder. Hazel & Garrett, Drilling Contractors, Caney, Kans. Tel. 116.

NEW 20 ft. wheel complete w/rods, channels, box bolts & miscl. parts for 12-C National Bandwheel Power, also No. CR. 10 New Idler w/24-34" Pulley. New 2⅝" pull rod connections or "Turtle-Backs." Box 253, Printy Pipe & Supply, Cut Bank, Montana.

PRITCHARD Model DBW 46-10 24' 4" wide x 65' 4" long x 45' 10" high, 10 bay atmospheric Cooling Tower, with 14 atmospheric sections. Call 4-0130, Tulsa, Oklahoma.

NEW IMPORTED SEAMLESS J-55

Regular monthly shipments Prime, API, 5½" OD and 7" OD casing. Hunt or Moody inspection. Performance bond furnished guaranteeing shipment.

BARON TUBE COMPANY

722 Oliver St. N. W., Atlanta, Ga.
Importers of Casing & Tubing
Phone Atwood 9721-2

EQUIPMENT FOR SALE

FOR SALE: Unit Rig U-34 draw works with 2—145 GKU Waukesha engines and 2—10,000 series Twin Disc Torque converters; 1—7¼" X 14" Gardner Denver Pump powered with a V-12 LeRoi; 96' Lee C. Moore mast with 7' substructure. This rig is complete with drill pipe and drill collars, ready to drill, located at Hobbs, N. M. Sharp Drilling Company, Box 1271, Midland, Texas.

FOR SALE: 15000' Rig. Bethlehem MC-950 draw works; 3 engine chain compound with double pump drive; 3 LRO Waukesha engines; 1—7¾" X 18" G600 Bethlehem Pump; 1—7½" X 16" G300 Bethlehem Pump; Lee C. Moore 136' Cantilever mast with 14' substructure; 2—12" QRC Cameron Blowout Preventors. This rig is complete with drill pipe and drill collars, ready to drill, located in Lea County, N. M. Sharp Drilling Company, Box 1271, Midland, Texas.

FOR SALE: At Kelly, Wyoming—National Drilling Machine #3-A-6 with WOK Waukesha engine, 12" shear poles, choice and complete 18" to 7" drilling and fishing tools, 3000 gallon Butane tank, drilling and sand lines. For further details write or call Gled Oil Co., 110 Midco Building, Tulsa, Oklahoma.

FOR SALE: 1—Baldwin Southwark Horizontal Duplex Pump 4 plunger 5¾" dia. x 18" stroke 470 G.P.M. @ 1000 p.s.i. 1—Bethlehem Steel Company horizontal pump 3 plunger 5½" dia. x 18" stroke 500 G.P.M. @ 1500 p.s.i. 2—Baldwin Southwark Vertical Triplex Pumps (1) 3¼" dia. x 10" stroke 70 G.P.M. @ 1300 p.s.i. (1) 5" dia x 10" stroke 160 G.P.M. @ 500 p.s.i. All of the above arranged for direct motor connection—no motors. Inquire of The Vulcan Detinning Company, Sewaren, N. J.

AVAILABLE for immediate delivery TWO MOBILE REPAIR SHOPS designed to provide mobile facilities for maintenance and repair of vehicles, construction and industrial equipment; test used only, equal to new. Write for further particulars; $20,000 each f.o.b Los Angeles. EXPORT TRADING CO., 1921½ Talmadge Ave., Los Angeles 27, Calif.

FOR SALE: Wilson Giant Draw Works complete with catheads, pump drive, and 2-JL-1335 Buda Motors compounded and ready to run $7500. Also 4500' 4½" good used DRILL PIPE; Butane Tank and other items at reasonable prices. Address 306 Derby Bldg., or telephone 5-4172, Wichita, Kansas.

GOOD Rotary Rig Complete, 2000 ft. 4½" pipe, truck mounted hydraulic mast. Box E-845, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Ideco 17½ rotary 4½ bushings —$2,350.00. Emsco 6AB Swivel 1450 lb.—$725.00. Mast, 65'—4—26" sheaves—$850.00. Mud Pump, G.D. 7¼x10 Climax engine complete—$5,350.00. Drill collar—6¼x32'—4½ reg. x 4½ FA Perfect $525.00. Box E-844, The Oil and Gas Journal, Tulsa, Oklahoma.

TANKS—from abandoned oil wells. Pipe, Tubing & Casing. 2—35,000 Bbl. Tanks 95x 28'; 1—35,000 Bbl. Tank 90x31'; 1—10,000 Bbl. Tank 60x20'; 1—10,000 Bbl. Tank 50x30'. Tanks will be dismantled, matchmarked, and loaded on cars. F.O.B. Pennsylvania District. Peter Grimm, 68 Schuyler Ave., Stamford, Conn.

FOR SALE: One Waukesha Diesel Engine, WAKH, Six Cylinder, Bore and stroke 6⅛ x 6⅛, Spark ignition type. Fair Condition. One Worthington Pump Hi Vol. 10 x 6 x 12, Simplex Type, driven by 275 psi. steam, 60 gpm, 12' suction pressure, 300 psi. discharge pressure. Good Condition. One Worthington Pump Hi Vol, 8 x 6 x 12, Simplex Type, Steam driven reciprocating, 125# pressure, 4" suction, 3" discharge, 1¼" steam inlet, 1½" steam outlet, valves built for gas or liquid. Fair Condition. Spencer Chemical Co., Pittsburg, Kans.

1—Parkerburg Pumping Unit 11' stroke, type S.C. 11 Serial #W.2-24. 3—Weld. steel Tanks 10'x12' 202 BBL. compl. with walk & stairway. 4500'—3½"—13.30 upset drill Pipe. All in good condition & very reasonable. Oklahoma Pipe & Supply, Box 4671—Tel.: ME 2-1644, Oklahoma City, Okla.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT FOR SALE

FOR SALE: 1-43C Heavy Duty Star Spudder A-1 Condition, complete with 10" to 5" Tools, Diesel Power and all necessary equipment to drill wells. Contact A. H. Alcock, Box 146, Office phone #301, Res. phone 2270, Chanute, Kansas.

FOR SALE: 400 ft. 5½ 17 lb. lapweld casing. 1600 ft. 5½ 14 lb. seamless 8 round thread range 2 casing. Box No. 635, Tel. 117, McLouth, Kansas.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WE BUY well drilling equipment machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

WANTED: Heat Exchangers Approximately 500 to 1000 Sq. Ft. Send Price and Full Particulars. Northwestern Refining Co., St. Paul Park, Minnesota.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

LIQUIDATION from PREMISES

AT NIAGARA FALLS, N. Y. ALL EQUIPMENT MUST BE REMOVED IN 30 DAYS. EVERYTHING OFFERED AT GIVE-AWAY PRICES.

COLUMNS

5'x47'x⅜", 20 trays, 40 PSI, welded (2).
5'x38'x⅜", 14 trays, 40 PSI, welded.
5'x30'x⅜" Spray, Packed, welded.
2'x12'8"x¾", 18 trays, cast iron.

REBOILER

7'x16'x⅜", 40 PSI, 2250 sq. ft. tube surface.

HEAT EXCHANGERS

1035 sq. ft., 4 pass, Braun, 250 PSI, all steel (2).
3460 sq. ft., Whitlock, shell 50 PSI, tubes 75 PSI, all steel (5).

GAS HOLDERS

100M cu. ft., 2 lift, 56'x24' (2).
572 cu. ft., single lift, 9'x9'.

BLOWERS

14"x18" Roots-Connersville, 1550 CFM, 6 PSI (2).

STACK

4'x66'x⅜" riveted.

COMPRESSORS

12"x9" Worthington, 275 CFM, 45 PSI (2).
15"x5½" Brunswick CO, 7500 CFH, 1100 PSI.
#7 Nash with Air Separator, bronze trim.

CARBON TRAPS

6'x17'7"x1⅛", welded (2).

• *WRITE FOR OUR EQUIPMENT CATALOG* •

HEAT & POWER CO., INC.
70 PINE ST. HANOVER 2-4890 NEW YORK 5
(Machinery & Equipment Merchants)

RESORTS

RANCH LIFE in TEXAS
Outstanding Dude Ranch - scenic hill country - deluxe cottages - swimming pool - riding - hunting - fishing - sports. Modern Airport, complete aviation service.
Write for folder, rates.
Flying L Ranch
BANDERA, TEXAS

HELP WANTED

REFINERY process engineers. Young men with some catalytic experience to start with independent refiners now starting to construct. State fully experience, salary desired. Box E-856, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

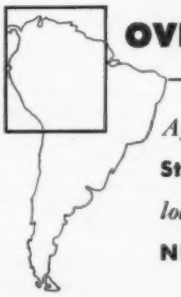
DISTRICT Geologist for Gulf Coast area wanted by strong independent integrated oil company. Location Houston. Please state age, education and starting salary expected. Address Box E-858, The Oil and Gas Journal, Tulsa, Oklahoma.

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL for LARGE INTERNATIONAL OIL COMPANY

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-667, The Oil and Gas Journal, Tulsa, Oklahoma



OVERSEAS OPPORTUNITIES

Affiliates of

Standard Oil Company (New Jersey)

located in South America

NEED...

PETROLEUM ENGINEERS:

Positions are now available for graduate engineers experienced in drilling, production, reservoir studies, or petroleum laboratory.

EQUIPMENT INSPECTORS:

Engineering degree and several years oil refinery metals inspection experience. Will inspect oil refinery equipment and request equipment renewals where corrosion, failure, or defectiveness under safety codes makes necessary.

GEOLOGISTS:

Graduate geologists experienced in surface geology are needed as exploration party chiefs. Opportunities also for experienced subsurface geologists and photo geologists.

MAINTENANCE ENGINEERS:

Engineering degree and several years oil refinery or chemical plant experience required. Will work in planning, scheduling, and coordination of oil refinery maintenance and construction.

These are regular staff positions offering liberal salaries and benefit plans.

WRITE

giving complete address, age, marital status, education, and details of previous experience. Box 308-F, Radio City Station, New York 19, N. Y.

HELP WANTED

GRAVITY Party Chief, operators and surveyors with experience in South America. Top salary for the right men. Present personnel advised of this ad. Box E-843, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL INDUSTRY Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974, Tom Robinson, owner. No fees. Needed now: Geologists with MS or Ph.D. with 3 to 10 years surface experience, willing to make 3 to 5 months trips to foreign countries and return to States for similar period prior to next asignment. Single men or childless married men best suited. (We are having success placing experienced LP-Gas men).

MAGNETOMETER operator for foreign assignment, top salary, and living allowances, transportation for family. Our personnel have knowledge of this ad. Box E-818, The Oil and Gas Journal, Tulsa, Oklahoma.

GRAVITY meter operator for foreign assignments. Top salary and living allowances for family. Prefer experience on Worden type meter. Our personnel have knowledge of this ad. Box E-819, The Oil and Gas Journal, Tulsa, Oklahoma.

METHODS and Procedure Manager, large independent integrated oil company, age 26-35, good opportunity for right man. Information submitted by applicant must include education, previous employment, salary expected and recent picture. Box E-857, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

GAS DISTRIBUTION ENGINEER

Growing natural gas company located in north central area has opening for gas engineer experienced either in preparation of material for presentation to regulatory bodies or in gas distribution work, including appliance installation on customers' premises, or both. Salary commensurate with ability and experience. Replies confidential. Box E-832, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

AGE 38, seventeen years experience with major, independent, and drilling contractor as petroleum engineer, production superintendent, drilling superintendent and general manager. Exceptional experience and acquaintance. Presently engaged in consulting work. Excellent references. Box E-786, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGICAL Engineer, 9 years experience with same organization in surface, sub-surface and production geology. Employed, married, age 33. Prefers position in active exploration department of company seeking oil or industrial raw materials. Box E-849, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Experienced land, lease, title, and contract negotiator. College Graduate, age 32. Currently in managerial position with Major in Williston Basin. Desires affiliation with progressive independent. Box E-828, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

CHEMICAL Engineer desires responsible position as technical administrative assistant to executive in refining-petrochemical industry. Fifteen years experience with large international oil company in refining operations, co-ordination between marketing and manufacturing. Age 41, married, children, domestic location only, will travel, linguist, available immediately. Box E-851, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PRODUCTION SUPERINTENDENT. Graduate Petroleum Engineer. 12 years responsible experience producing industry. Geological ability. Mid-Continent or Rocky Mountains. Box E-774, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTORNEY, experienced in land and title work, Federal income tax laws, legal investigations, now employed, desires position where legal ability can be used productively. Box E-825, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Engineer with 20 years' experience, both office and on the job, divided—production, gasoline and refinery processing. Experience in Maintenance, Design and Development, Construction, and Operation. Box E-842, The Oil and Gas Journal, Tulsa, Oklahoma.

Petroleum Engineer, University of Texas, 5 years Refinery processing, 4 years refinery designing and construction, 2 years sales engineering. Desires lubrication or engineering sales, process design work, or refinery engineering. Prefer Tulsa, Gulf Coast, Dallas area. Box E-847, The Oil and Gas Journal, Tulsa, Oklahoma.

MASTER mechanic, 39, experienced all types rigs, draw works, mud pumps, swivels, air compressors, pumping units, all types gas and Diesel engines, electric motors, light plants, desires responsible position drilling department or production. Prefer West Texas. Box E-854, The Oil and Gas Journal, Tulsa, Oklahoma.

MATHEMATICS major, woman, former math instructor, desires position in industry where training, experience, ability to prepare reports could be utilized. Available for interview. Box E-855, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer 27 single three years field production experience in South America desires position with small independent. Box E-853, The Oil and Gas Journal, Tulsa, Oklahoma.

ELECTRICAL Engineer—28 years. Domestic and Foreign experience, in management, construction, and engineering. Would like to contact Petroleum Operating Company, Utility Company, or Construction Firm Box E-846, The Oil and Gas Journal, Tulsa Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

GEOLOGISTS

INDEPENDENT exploration and research geologist desires retainers. Experienced in West Texas, New Mexico, Central Texas, North Texas, Oklahoma and surrounding areas. Located in Fort Worth. Box E-826, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST

For photogeologic work with consulting firm located Rocky Mountain area. Master's degree or at least two years' surface experience. Salary open. Give full details of training and experience with first letter. Our personnel know of this ad.

Box E-848

THE OIL AND GAS JOURNAL

Tulsa, Oklahoma

ADVERTISING SERVICE

ADVERTISING—A complete advertising service in all media—Art, copy, layout, public relations. Just two things to offer: service and ideas. Bill Dean Advertising Agency, 104 E. 9th. Phone 2-6841, Tulsa, Oklahoma.

ROYALTIES

WILLISTON BASIN ROYALTIES

Dealers in Montana royalties since 1921, we now specialize in royalties under major company leases in the Montana portion of the Williston Basin. For information on our method of operation, write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

WE will buy producing or non-producing oil royalties. Standard Security Company, 111 Broadway, New York 6, N. Y.

PRODUCTION

We Will Buy

PRODUCING landowners royalty and producing leases. Any amount, any area. Confidential information required and furnished. A 1 Bank Reference.

COMBEST ROYALTY COMPANY
825-826 Amarillo Bldg.
Amarillo, Texas

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

WE invite inquiries from persons interested in Oil and Gas Leases in Southern Alberta, North Central Montana and the Williston Basin. Box E-664, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2133, Denver, Colorado.

OWN 460 acres Linn Co., Kansas, never been drilled. Could block good size lease gas & oil in area, want someone to drill. E. A. Tanquary, 1106 W. 77 Terrace, K. C. 5, Mo.

2880 ACRES north of Knowles, Beaver County, Oklahoma, Township 6 North, Range 26 E C M. Want good bonus plus drilling lease. S. M. Sargent, Box 28, Vista, Missouri.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

POTENTIAL OILFIELD
S E NEW MEXICO

Drilling shows 2-Oil Sands of indicated flowing capacity above 3200 ft. in Permian. Offset well to be drilled on block by leading Independent Operator. Participating Interests up to ¼ or parts thereof offered to Investors who understand great potential value and competent operation. Box E-852, The Oil and Gas Journal, Tulsa, Oklahoma.

NORTHWESTERN NORTH DAKOTA LEASES AND MINERALS

Our latest lists with prices, mailed on request. Will also buy acreage where you want it. Any place in Northwestern North Dakota. References exchanged.

BORSTAD & FITZMAURICE
Oil Properties
4th Floor 1st National Bank Bldg.
Phone 40-226 Minot, North Dakota

LEASE AND DRILLING BLOCKS

FOR SALE: New 70 acre lease, near production, hot play, Shelby County, Texas, $3 per acre. Write C. A. Parker, 136 Austin St., Center, Texas.

NEW ten year oil lease 320 acres Valley County, Williston Basin, Mont. Also high grade fullers earth under same land. R. O. Barnsley, 930 Lincoln Ave., Palo Alto, Calif.

REAL ESTATE

OFFICE SPACE: Large new building. Fireproof, completely air-conditioned, elevator, free parking facilities for you and your customers. Draw your floor plan to suit your needs. Your office will be ready for you 60 days after we get your floor plan. Call or write: Western Chevrolet, Abilene, Texas.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

BUSINESS OPPORTUNITIES

MANUFACTURERS! Would you like representation in Southern Oklahoma, around Duncan, Ardmore, and Ada area? An experienced sales force in close contact with drilling, production and supply companies, desires to represent manufacturer of highest quality oil field specialties. Address Box E-841, The Oil and Gas Journal, Tulsa, Okla.

ATTENTION: SALES MANAGERS

New and active Houston Oil and Industrial Sales Organization desires to expand in the Texas Gulf Area. Will assume new accounts in related lines.

Box E-840, The Oil and Gas Journal
Tulsa, Oklahoma

DO YOU HAVE SOMETHING YOU WANT SOLD?

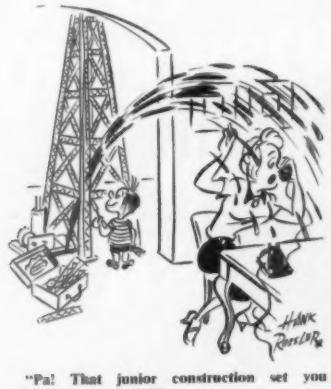
Well established distributor to the oil and gas industry. Pipe lines, refining, gas distribution, etc. Desires additional items to sell. Excellent contacts, proven ability to produce.

Box E-850, The Oil and Gas Journal
Tulsa, Oklahoma

RANCHES and FARM LANDS

NORTHERN LAKE HOME

Attractive 4 bedroom, 3½ baths. Beautifully furnished. 150 foot frontage on beautiful Lake Bemidji, Minnesota, 2-car garage. 2 servants rooms with baths. On paved road. Convenient to everything, but in heart of wild life area. Albert Clark, R.F.D. 5, Bemidji, Minn. Phone 536W.



"Pa! That junior construction set you gave him—it works!"

ADVERTISERS

Abegg & Reinhold Co. 159
Advertising Council, Inc. 182
Ajax Iron Works 41
Allison Division of General Motors 30, 31
Alten Foundry & Machine Works 177
Aluminum Co. of America 136
American Hoist and Derrick Company 160
American Manufacturing Co. of Texas 4
Anglo-Iranian Oil Company, Limited 46, 47
Armco Drainage & Metal Products, Inc. 62
Associated Oil Field Rentals, Inc. 172
Associated Research, Incorporated 136
B and W, Incorporated 159
Baird Mfg. Co. 176
Bakelite Company
A Division of Union Carbide and Carbon Corporation 140
Baker Manufacturing Co., The 146
Baker Oil Tools, Inc. 68
Beacon Petroleum Company 134
Broderick & Bascom Rope Co. 9
Butler Manufacturing Co. 113
Byron Jackson Co.—P B Division Front Cover
Cameron Iron Works, Inc. Inside Front Cover
Chain Belt Co. 49
Chicago Bridge & Iron Company 81
Chicago-Wilcox Mfg. Co. 152
Classified Advertising 193, 194, 195, 196
Cleveland Worm and Gear Co., The 40
Coyle Lines, Incorporated 179
Crose Manufacturing Co., Inc., M. J. 144
Cummins Engine Co., Inc. 21
Darling Valve and Mfg. Co. 18
Dean Brothers Pumps, Inc. 153
Delta Engineering Sales Co. 156
Dia-Log Company, The 38
Diamond Alkali Company 52
Diamond Chain Company, Inc. 162
Dominion Bridge Company, Limited 36
Dowell Incorporated 68
Drilling & Service, Inc. 183
du Pont 3, 22, 23
Electric Auto-Lite Co., The 166
Empire Trust Company 169
Fairbanks, Morse & Co. 2
First National Bank & Trust Co. of Tulsa, The 145
Flexonics Corporation 13
Fluid Packed Pump Company 115, 116
Fluor Corporation, Ltd., The 62
Ford Alexander Corporation, The 56
Foxboro Company, The 153
Franks Machine Co. 165
General American Transportation Corporation 89
General Electric Company 38, 39
General Electric Co., Electronic Dept. 6
Geophysical Service, Inc. 174
Goodyear Tire & Rubber Company 8
Gott Mfg. Co., H. P. 136
Grancell, I. H. 159
Grant Oil Tool Co. 171
Great Northern Map Company 180
Grinnell Company, Inc. 51
Gulberson Corporation 167
Halliburton Oil Well Cementing Co. 12, 17
Helicoid Gage Division, American Chain & Cable Co. 60
Hinderliter Tool Co., Div., H. K. Porter Company, Inc. 64
Huey & Co., S. E. 152
Hughes Tool Co. Back Cover
Hydril Company 132
Inferno Co., The 160, 180
International Harvester Co. 103
International Nickel Company, Inc., The 26
Jensen Brothers Mfg. Co. 173
Kaiser Steel Corporation 10
Kemp Mfg. Co., The C. M. 117
Kinzbach Tool Co., Inc. 161
Koch Engineering Company, Inc., The 85
Lane-Wells Company 28
Larkin Packer Company, Inc. 170
LeBus Rotary Tool Works 109
Lehmann Machine Company 27
Leschen & Sons Rope Co., A. 111
Linde Air Products Company, A Division of Union Carbide and Carbon Corporation 44
Lloyd Metal Foundry Co. 150
Magnet Cove Barium Corp. 138
Marlow Pumps 142
Martin, Manufacturer, John N. 140
Metal Goods Corporation 43
Minneapolis-Honeywell Regulator Co., Industrial Division 14, 15
Mission Mfg. Company 124
Missouri Dredging Co. 150
Modern Engineering Co., Inc. 140
Monsanto Chemical Company 29, 198
Moore Corporation, Lee C. 120
Multi-Clean Products, Inc. 19
Murdock Tank & Mfg. Co. 176
National Airoil Burner Co., The 157
National Supply Co., The 100, 101
Norris Brothers, Inc. 157
Oil and Gas Journal, The 173
Oil Center Tool Co. 53
Oliver United Filters, Inc. 54
Owens-Illinois Glass Co., Kaylo Division 48
P B Division-Byron Jackson Co. Front Cover
Paris Distributor, Inc., Henry H. 153
Penn Controls, Inc. 149
Perrault Brothers 153, 176
Petroleum Electric Power Assn. 24
Petroleum Rectifying Company 7
Pipe Line Service Corp. 63
Raybestos-Manhattan, Inc. 20
Reed Roller Bit Company 61
Refinery Supply Co., The 11
Republic Rubber Division of Lee Rubber & Tire Corp. 35
Republic Steel Corporation 55
Reynolds Metals Company 18
Ridge Tool Company, The 114
Rinehart & Company, Inc. 25
Rockwood Sprinkler Company 34
Roebling's Sons Company, John A. 33
Ross-Martin Co. 161
Schield Bantam Company 143
Schlumberger Well Surveying Corp. 181
Scott-Rice Company 160
Service Foundry—A Division of Avondale Marine Ways, Inc. 161
Shand and Jurs Co. 154
Shell Oil Company 25
Smith Corporation, A. O. 45
Smith Oil Tools Co., H. C. 158
Snyder Map Service 112
Standco Brake Lining Co. 160
Steel Forgings, Inc. 152
Stitt Ignition Co. 157
Templeton, Kenly & Co. 160
Texas Company, The 42
Thomas Flexible Coupling Co. 168
Thornhill-Craver Co. Inside Back Cover
Torrington Company, The 50
Tulsa Crating Co. 157
Union Carbide and Carbon Corporation, Bakelite Company 140
Linde Air Products Company 44
U. S. Enameling Co. 179
United States Gasket Company 57
United States Treasury Department 164
United Supply & Manufacturing Co. 151
Universal Oil Products Co. 58, 59
Victor Products Corp. 157
Walworth Co. 5
Warner Lewis Company 152
Well Equipment Mfg. Corp. 178
Western Supply Company 148
Williamson, Inc., T. D. 147
Wilson Manufacturing Co., Inc. 32
Wolverine Tube Division Calumet & Hecla Consolidated Copper Company 37

LEGAL

Sealed bids for oil and gas mining leases on 13,850.91 acres of trust lands on the Crow Indian Reservation, Big Horn County, State of Montana, will be received at the Office of the Superintendent, Crow Indian Agency, Montana, up to 2:00 o'clock P. M., Montana Standard Time, August 1, 1952. For further information, call or write L. C. Lippert, Superintendent, Crow Indian Agency, Crow Agency, Montana.

LEGAL

8,309.99 acres of Tribal Indian lands located in Township 4 South, Ranges 5 and 6 West, USBM, on the Uintah and Ouray Reservation, Utah, are being advertised for oil and gas lease, bids on which will be opened July 25, 1952, at 2:00 P.M., at the office of Harry W. Gilmore, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

How to control slime and algae in refinery cooling towers

Slime and algae that thrive in the water of refinery and air conditioning cooling towers are effectively and economically controlled by Monsanto Santobrite. Such control helps maintain peak efficiency of the cooling system and saves the cost of frequent mechanical cleanings.

Santobrite (sodium pentachlorophenate, technical) has proved its ability to control slime and algae even in waters where oil is present to feed such microorganisms. Easy-to-use Santobrite has established its effectiveness in years of service.

If you have a problem of slime and algae in cooling towers, contact the nearest Monsanto Sales Office or write for a copy of Technical Bulletin No. O-15 which gives technical details on Santobrite and tells how to use it. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

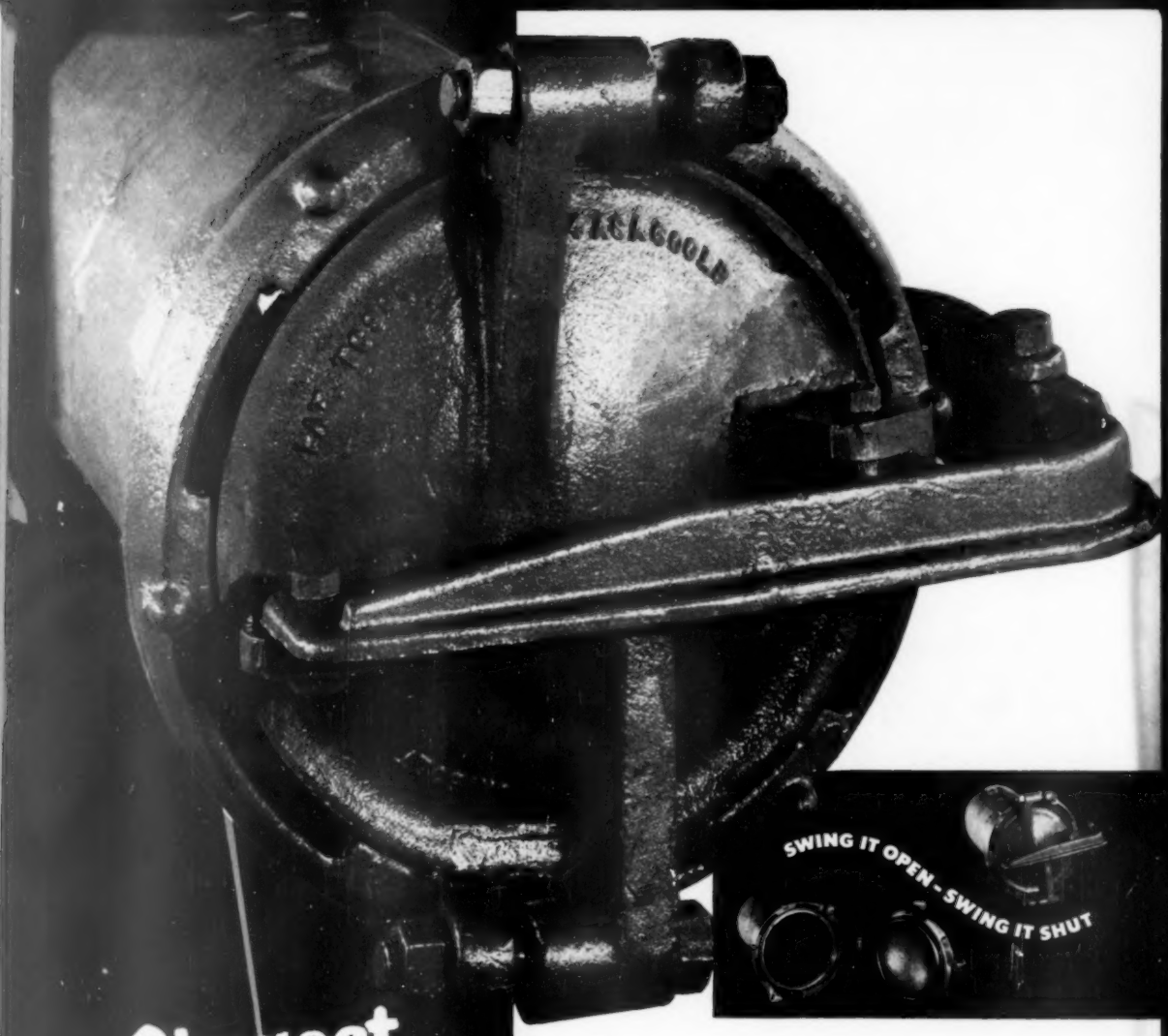
Santobrite: Reg. U. S. Pat. Off.

SANTOBRITE

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle, Twin Cities. In Canada, Monsanto Canada Limited, Montreal.



Biggest "Discovery" in Years

UNIBOLT SCRAPER TRAP

The UNIBOLT Hinged Scraper Trap with self-sealing gasket swings open and shut like a door by simply releasing two bolts. No heavy lifting . . . nothing to fall on workmen . . . no leaks . . . no time-consuming multi-bolt flanged closures. Installed on an oversize barrel, it's no job at all to get a pig in or out of this trap.

These simple, convenient closures are equally desirable for gas line blowdowns, strainers, terminal manifolds, or any other service where pressure vessels must be opened for inspection, cleaning, repairing, connecting to a line, etc.

Bulletin PL-*510* will gladly be sent on request.

THORNHILL - CRAVER COMPANY

P. O. BOX 1184 HOUSTON, TEXAS

This clean bottom hole pattern was cut in Pink Quartzite by a Hughes W7R hard rock bit.

HUGHES TRI-CONE®
ROCK BITS

• Designed for faster drilling

Every rock bit cuts a distinctive pattern as it rolls on bottom. These telltale imprints reveal the drilling characteristics of the bit.

That is why research, that brings the bottom of the hole to the surface—where the bit patterns can be studied and bit performance analyzed—plays such an important part in the development of Hughes Rock Bits.

Teams of research and product engineers test-drill every bit undergoing design changes. Blocks of rocks, representing specific formations, are used in these tests made under controlled conditions.

Armed with facts from these studies—and backed by 43 years experience in designing and manufacturing rock bits—Hughes engineers are able to design bits that are recognized the world over as the standard of the industry.